

# The Chemical Age

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AN index to Volume XXVI of THE CHEMICAL AGE is published with this issue. It will be found inside the back cover, whence it can readily be detached for binding purposes.

## Notes and Comments

### The Nottingham Meeting

ARRANGEMENTS have been completed for the fifty-first annual meeting of the Society of Chemical Industry at Nottingham next week, and there is every reason to believe that the programme will be entirely in keeping with the high tradition set by the Society in the past half century. This will be the fourth occasion in the history of the Society that it has met at Nottingham, previous meetings having been held there in 1890, 1898 and 1914. Twelve meetings have been held in London, six at Manchester, five at Liverpool, four each at Newcastle, Glasgow and Birmingham, three each in New York and at Edinburgh and Nottingham, two at Leeds and one each at Montreal, Bristol, Cambridge, Bradford and Sheffield. The annual meetings have usually been held on the invitation of a local section in a town in the area covered by the section, but a few have been held in other places. This year the Society is the guest of the Nottingham section and, as on several previous occasions, the meeting is being held under the patronage of the King.

The annual meeting will be held at the University College on Wednesday morning and will be preceded by a reception on Tuesday evening by Lord and Lady Trent and the committee of the Nottingham section. After a civic welcome and the transaction of the annual business, Professor G. T. Morgan will deliver his presidential address on "Ourselves and Kindred Societies." On Thursday morning the Messel Medal will be presented to Sir William Pope, who will give an address on "Forty Years of Stereo-chemistry." The social side of the programme is attractive, both to the members and their lady visitors, and will include an invitation luncheon, an afternoon reception by the College Council and a civic reception at the Council House on Wednesday, and the annual dinner at the Mikado Restaurant on Thursday. In addition there is a wide choice of works visits and purely pleasure tours on Thursday and Friday. Many of the industrial activities of Nottingham are closely allied to chemistry, and the works visits will therefore be of more than ordinary interest. The Nottingham section deserved to be congratulated upon arranging such a programme.

Nottingham, with its thousand years of history, is proud of its multifarious activities and prouder still of the pre-eminence of its unique products, and nowhere

will the observant visitor find more evidence of the penetration and power of technical science and especially industrial chemistry. The art of chemistry must have found application in these parts from the earliest times. The evaporation of sea salt on the Lincolnshire coast, the manufacture of charcoal and then iron, go back almost to the times of pre-history. Nottingham and district are fortunate in regard to geological deposits. Gypsum, magnesian limestone, blue lias limestone, and the limestone of Crich have long yielded mortars, cements and agricultural limes for local use. In the Middle Ages there were tanneries in the city, and also iron works with charcoal furnaces in the Sherwood Forest. The iron ore beds in the Vale of Belvoir are still worked to provide the huge outputs of Holwell and Stanton. The coal measures of the district are amongst the most important in the country.

The central position of Nottingham was no doubt a factor in the successful establishment of a drug distribution depôt to eventually develop into the enormous works and fine chemical factory of Boots Pure Drug Co., which has made advances in the realm of modern chemistry, pharmacy and therapy, and whose products include insulin, arsphenamines and vitamins. For many years the firm has manufactured saccharin, aspirin, chloroform and other pharmaceutical commodities. Amongst technical chemical interests, in addition to many establishments for dyeing, bleaching and dressing of textiles, the tanneries specialise in fine and other classes of leather, some varieties of Nottingham leather being pre-eminent in the leather-using trades. Academically, chemistry at Nottingham, is led by Professor F. S. Kipping, and the staff and students of his school continue to uphold the tradition of Nottingham University College.

### Three and a Half Per Cent

By means of the greatest financial transaction in history, the most important event since the declaration of war eighteen years ago, British credit has moved from a five per cent. not to a four per cent., as was thought possible a week or two ago, but right up at one step to a three and a half per cent. basis. The law of supply and demand comes into its own again, and the world at once is a better place. This two thousand million deal justifies the best that was hoped of the National Government. It is a complete answer

to any who have been inclined to doubt the wisdom of giving up for a time the old divisions of domestic politics. It also puts Britain into its proper place. The financial foundations of the world, centred in the British budget and the City of London, are once again shown to be as sound as ever, and the world will not be slow to recognise that new-found knowledge, and to act upon it.

If Mr. Chamberlain's example in the realm of finance is now to be followed by his colleagues in other realms, the world will be a better and a happier place. He watched and studied the situation, kept his own counsel, and at the right moment did the thing that seemed to him to be right. He has not needed the assistance of thirty-five international conferences, he has not spoilt the right by endeavouring to express it in a formula which would also satisfy the wrong. He has in the best tradition of historic British statesmanship, taken a decision and acted upon it with splendid isolation.

### The Outlook Changed

ON the practical side the results of the conversion operation will be stupendous. The operation being complete—and no one doubts that it will be complete within a few weeks—the price of money ceases to have the unnatural political importance of the last few years, and trade and industry once more takes its place in the front of the stage. But we are not out of the wood. Generations of extravagance and political folly are not wiped out by a single financial operation, even of this unprecedented magnitude, and the confidence, the hope, the optimism which that operation will engender will require to be maintained. The world will want to be sure that we have learnt our lesson, that the political follies of the past *are* of the past. The twenty-three millions taken out of the pockets of the investing classes must not be squandered in other directions. This money comes out of the pockets which ordinarily provide the money for industrial and commercial development, and it must be put back into those same pockets by way of remission of taxation, and not added to the heap of extravagance which has all along been the real trouble. This natural operation must be followed by other natural operations. The interest receivers have been robbed of the increment which came to them from the general inflation of the post-war period, but they are not the only receivers of increment. There remain unnatural wage rates and there remain doles and pensions calculated on cost of living figures which have long since disappeared. All these unearned increments must now follow the example of the five per cent.

There is no need, however, at this juncture to stress these consequential necessities. They will happen, everybody knows they will happen, just as for months past everybody has known that the debt conversion would happen. It is, however, wise to remember, and especially wise for the beneficiaries to remember that the sooner these things do happen, the sooner will the complete revival of prosperity take place. Meanwhile we shall see a cessation of all the nonsense recently talked about money, a settling down to the new sound basis of the London money market, a revival in confidence at home and abroad, and an upward trend in business.

### Cosach Rumours

THE reports of what Chile is or is not going to do with Cosach have been so frequent and so varied in the last few weeks that it is impossible to attach much importance to any of them. The latest declares that the company is to be wound up in such a way that the Chilean Treasury will suffer no loss. That may certainly be dismissed—unless the Chilean Junta has discovered some new and unique definition of what a loss is—for, if anything is certain, it is that each of the interests involved in Cosach will have to accept drastic modification of its claims if anything is to be salvaged at all. Even the first part of the report, that the company is to be wound up, seems distinctly improbable. The normal winding-up, with sale or distribution of assets, is virtually precluded by the fact that those who have charges on the fixed assets have no sort of desire to take over the working of them, while it is hard to conceive of any buyer being willing to pay an adequate price for the concern in the open market. Commenting upon this, "The Financial News" is of the opinion that a sweeping re-organisation is required rather than a winding-up or a dissolution. In devising a scheme for that reorganisation, it is to be hoped that the Committee and the other interests concerned will not only consider the legal rights of the present, but also the equitable claims arising out of the past. An important part of the Cosach assets was contributed by companies who were forced into the combine practically without option, but who now find that their lands, plant, and even saleable stocks are claimed by interests with charges ranking far ahead of their own. The fact that some of the companies which were brought in were already past hope of profitable working should not be allowed to damage the claim to consideration of those who had modern equipment and workable lands. In the radical construction which has now become necessary it is, however, only just that some differentiation should be recognised between the best equipped of the old companies and the worst of them.

### New Uses for Cane Sugar

THE article by Dr. Gerald J. Cox and Dr. John Metschl which appears in this issue of THE CHEMICAL AGE outlines the results of their intensive researches at Mellon Institute in connection with new uses for cane sugar as an industrial raw material. By treating cane sugar with strong acetic acid or its derivatives they have obtained a substance to which the name of sucrose octaäcetate has been given. This product has been found useful for certain types of lacquers and adhesives and in the manufacture of paper. When sugar is treated with acid at high temperatures and the resulting levulinic acid is combined with alcohols, fragrant esters having good solvent powers are obtained. The most outstanding result of this investigation, however, is a possible consumption of large quantities of cane sugar in lime-sand mortar, for it has been found that if sugar equal to as little as 6 per cent. of the weight of the quicklime is included in the mortar, the tensile strength of the latter is increased about 60 per cent. Sufficient promise of a larger application of sucrose octaäcetate has brought its production to a semi-commercial stage.

## New Hazards in Handling Chemicals

### Points from the Report of the Chief Inspector of Factories

THE total number of accidents recorded by the Chief Inspector of Factories and Workshops in his Annual Report for the year 1931 (H. M. Stationery Office, price 2s. 6d. net) again shows a decrease from 144,758 to 113,249 and the fatalities from 899 to 755. This further decrease is doubtless due to a great extent to the continued depression in industry during 1931. The majority of accidents were again due to causes in which the human element is an important factor. Thus, persons falling and persons being struck by falling bodies accounted respectively for 30 and 18 per cent. of the fatalities and 12 and 11 per cent. of the non-fatal accidents, while 22 per cent. of the latter were due to persons handling goods. Accidents to young persons constituted over 16 per cent. of the total, as in previous years.

#### Explosion Hazards

Despite the increased application of scientific knowledge to manufacturing processes and human care and ingenuity, explosions continue to occur not only from scheduled explosives but also from a wide variety of solids, liquids, vapours and gases used in industry. Following the serious dust explosion in a steel silo for storing meal at Liverpool in 1930, interesting and important large scale experiments have been carried out by Professor Wheeler at the Coal Mines Research Station, Buxton. By means of these experiments, the dimensions have been ascertained of the vents which are necessary to relieve the pressure by explosion in such silos.

Although the "thermit" process of making metallic alloys is quite well known, probably few persons would have anticipated that a warm mixture of aluminium powder and copper oxide could be exploded merely by mixing it with a shovel. Yet this occurred at a works in Liverpool and two men were seriously burned, one of them fatally. The mixture containing aluminium swarf and copper oxide was being made for the purpose of preparing a copper aluminium alloy. The copper oxide, which had just been dried and was still hot, was being mixed with the aluminium by shovelling on an iron plate, when an explosion took place. Experiments were carried out by the Research Department, Woolwich, and it was found that the fine dust removed from both ingredients by sifting, when mixed in the proper proportions, could be ignited by a blow.

During the year another explosion of an azo dyestuff was also reported. The material in question was derived from para-nitraniline and salicylate of soda. After drying, it is usual to add salt before grinding, but on this occasion the salt had not been added and whilst the undiluted material was being ground in a ball-type mill consisting of a cast-iron cylinder containing iron rollers, a violent explosion took place. Enquiry into this accident is still being carried on by the Research Department, Woolwich. It is possible that the explosion, as in similar previous cases, was due to an uncoupled diazo body present in the dyestuff. Probably it would have been less likely to happen if the material had been diluted, before grinding, with salt.

After the publication of the report upon the explosion in 1930, at a chemical works in Castleford, Yorks, two of the Engineering Inspectors visited all works where nitric and sulphuric acids are mixed for use in nitration processes. No dangerous conditions were discovered except at one works, where nitric acid was being mixed with waste acid from a nitration process in a mixer not provided with means of cooling. The firm was asked to make the necessary provision for cooling and this was done without delay.

#### Washing Inflammable Spirit by Acid

A fire and explosion which caused the deaths of three laboratory chemists and considerable destruction of property, occurred in the Stoke-on-Trent district, at a plant in which spirit obtained from the low temperature carbonisation of coal was being treated with sulphuric acid. One batch of spirit had been treated with acid and washed in the usual manner without incident, but during the treatment of a second batch the liquid suddenly frothed over the side of the washer and spread some distance along the yard, where it became ignited. Storage tanks in the neighbourhood were set on fire

and violent explosions resulted. Investigations so far as it has been completed, suggests that the accident was due to the use of too concentrated acid which produced a violent reaction with olefines present in the spirit, the risk being increased by lack of vigorous stirring. The opinion of experts is that only acid of less than 80 per cent. strength should be used for such treatments and that this should be added very slowly with constant agitation. The accident suggests that whenever such spirit or even ordinary benzol is treated with acid, (1) the wash-house should be isolated by means of a ditch, so that if frothing-over occurs, the spirit will be prevented from spreading over a large area, (2) storage tanks on such plants should be placed as far as possible from the washing plant, and (3) such tanks should be provided with vent pipes fitted with flame-arresting gauzes, so as to reduce the chance of explosion if fire occurs in their neighbourhood. In the wash-house itself, very full provision should be made for escape in case of fire. The plant should be earthed and all electric fittings should be of flame-proof design.

Petrol and similar inflammable liquids have again been the primary agents in a number of explosions. The majority of these arising from petrol occurred during the soldering, repairing of tanks which had contained this liquid. Persons who repair such tanks cannot be too strongly warned that there is always risk of explosion when carrying out this work unless proper steps have been taken to free the tank from all residual petrol and vapour. Washing out with cold water or allowing a tank to remain for some hours with the filling and other orifices open are quite inadequate methods, though too often adopted. Tanks should be either steamed out or heated in hot water and then thoroughly ventilated with compressed air or air from a tyre pump. Two explosions in connection with dry cleaning processes occurred in the Nottingham district, and were probably due to ignition of petrol vapour by static electricity.

The number of works in which the manufacture of lacquer solutions is carried on is comparatively small and the conditions generally are satisfactory. Conditions are also now satisfactory in the majority of the places in which spraying and dipping is carried on, but from time to time cellulose is found being handled by people who have little appreciation of the dangers involved.

#### Chromium Plating

Very good progress has been made with the enforcement of the new chromium plating regulations. Much of the work had in fact been done before they came into force. The majority of the vats in use are of a standard pattern made by one firm, and no difficulty has been experienced in securing the required exhaust draught. In a few vats constructed by another firm the efficiency of the exhaust failed owing to the lateral ducts being too shallow. In some few also the ventilating system was quite inefficient and had to be completely re-modelled. In one well equipped plating shop red electric bulbs are fitted near the switches which automatically light when the fan motor is switched off as a warning that the exhaust is not in operation. One or two firms have adopted an excellent system to avoid drippings on the floor while the articles are transferred from the plating bath to the swills. Each bath has been arranged end on to the next one with the height of the tops of the baths decreasing so that, by the time the jig is lifted out of the last hot water bath the articles come out practically dry and free from chromic acid. Drippings fall on drip boards between the ends of the baths and thus keep the floor and the operator clean.

#### Aniline Poisoning

In the sectional report contributed by the Senior Medical Inspector of Factories five cases of carbon bisulphide poisoning are reported, four in the treatment of acetate of cellulose by carbon bisulphide, and one in the manufacture of carbon bisulphide. None of these cases was of a serious character. Aniline poisoning numbered 30 cases:—Making intermediates (D.N.B., D.N.T., T.N.T.), 10; making or use of aniline, 8; making aniline colours, etc., 6; aniline black dyeing, 3;



5-chloro-ortho-toluidine, 1; removing ink stains from linen, 1; arseno-benzol process, 1. Nine cases in the making of intermediates were reported from one firm as against only four in 1930. The most frequent cause of this form of poisoning is absorption through the skin, and two cases illustrate the necessity for prompt action. In the first a man carrying a bucket of aniline oil slipped and splashed the oil over his arms and coat. He washed his arms but afterwards replaced his coat. An hour later he began to feel dizzy and drowsy, gradually becoming cyanosed. He was removed to hospital in a semi-conscious condition. In the other, residual aniline was being blown out under 5 lb. pressure from a vessel into a drum. The pipe slipped and in endeavouring to replace it some of the liquid blew into the man's mouth and over his face and clothes. His mouth was immediately washed out, his clothes stripped and his body washed. In spite of this prompt treatment he became drowsy and sleepy, but there can be little doubt that it saved his life. The case occurring in connection with 5-chlor-ortho-toluidine differs from those reported last year which occurred during the drying process. The present case affected a man shovelling the wet salt, and instead of wearing rubber gloves he wore only two pairs of cotton gloves.

#### Arseniuretted Hydrogen

Under this heading there were seven cases, two being fatal. Six cases, including the two fatal ones, arose in the damping down of residue containing a metallic arsenic. The object of this damping down was to eliminate the dust during moving. These arsenides, when treated with water, particularly hot water, evolve arseniuretted hydrogen. Comparison may be made with cases arising from arseniuretted hydrogen generated in much the same way which occurred

in 1923 and which were reported in the annual report for that year. In 1928 the firm tried an experimental method of stirring sawdust with the molten metal so as to open out the dross. During this experiment 10 men were affected. Following these cases this experimental method was abolished. No further cases occurred at the factory until January of this year, when 2 men dealing with dross from the furnace were affected. Another case subsequently occurred in May. Unfortunately none of these cases were reported and it was not until the last series of cases in November that the occurrence was brought to the notice of the Factory Inspectors. On the occurrence of the present series the firm sought the advice of Professor Roberts, chief analyst to the Liverpool Corporation and professor of chemistry at the University. He at once suspected that the cause of the illness affecting these men was arseniuretted hydrogen due to the watering of the dross containing arsenides. Steps were then immediately taken to deal with the dross in a manner which would ensure oxidation of the arsenides.

The other case occurred in a chemical worker who was engaged in the manufacture of zinc sulphate from zinc ashes (containing 0.12 per cent. of arsenic) and crude vitriol (containing 0.28 per cent. of arsenic). The tank in which this reaction took place was in the open air and was completely enclosed and provided with steam jet exhaust. There were doors in the side of the hood which were opened for the purpose of feeding in the vitriol, and also for stirring after the first reaction is over. After the vitriol is tipped in the doors are closed, the ashes being admitted by a self-closing chute. Failure to close the door before and during the vigorous reaction led to the occurrence of this case of arseniuretted hydrogen poisoning, with jaundice.

## The Handling of Explosives

### Decrease in the Number of Accidents Reported

THE 56th Annual Report of H. M. Inspectors of Explosives for the year 1931 records that there was only one fatal accident during manufacture. This occurred in a fireworks factory and caused the loss of two lives. The year, however, was made eventful by the serious explosion at the Royal Naval Cordite Factory in Dorset. Government factories are outside the scope of the Explosives Act, but the chief inspector was appointed to the committee that investigated the accident. No serious irregularity came to notice in connection with the manufacture of explosives in licensed factories. Altogether, there were twenty-two accidents in manufacture, including the fatal one previously mentioned, and they caused injuries to ten persons. The total number of accidents due to explosives reported during the year was 249, causing twenty-six deaths and injuries to 252 persons. These figures show a very considerable decrease over those reported during the last ten years. Accidents under conditions not controlled by the Explosives Act represent approximately 90 per cent. of the total accidents. Thirty-nine accidents due to petroleum spirit were reported, and caused fourteen deaths and injuries to twenty six persons. The use of petroleum spirit caused four deaths, and injuries to three persons.

The quantity manufactured of those nitro-glycerine explosives which are liable to freeze continues to decrease year by year. It is felt that the time has almost come when those nitro-glycerine explosives which are liable to freeze will no longer be manufactured. Both laboratory and practical tests have shown low-freezing explosives to be in no way inferior, and, in fact, these explosives are rather more sensitive to detonation than the freezing types. When low-freezing explosives take the place entirely of explosives liable to freeze, the complication of warming pans which, by regulation under the Coal Mines Act, 1911, must be provided when explosives containing nitro-glycerine are used, will be dispensed with.

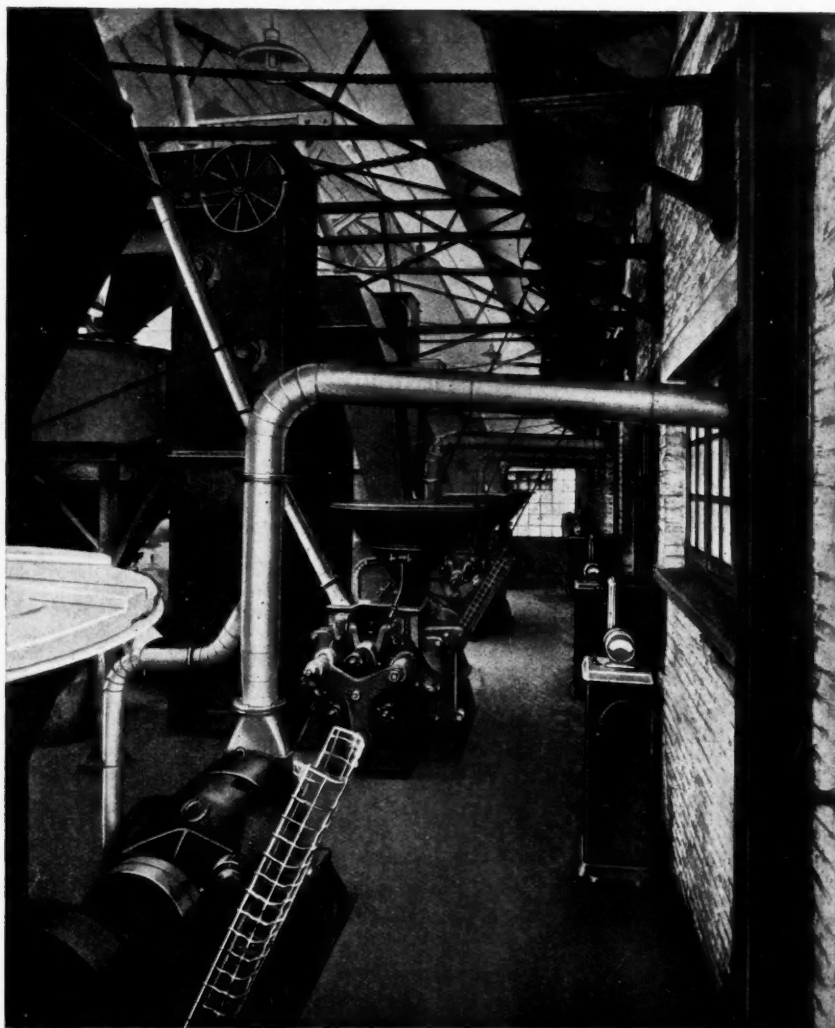
#### Dangers from Grinding Diazo Dyes

An explosion occurred at the works of Clemons, Marshall and Carbert, Ltd., at Hunslet, Leeds, whilst grinding a diazo dye (sodium salt of Metachrome Orange R.) in a mill and

one man was severely burned. The mill consisted of a hollow cast iron cylinder 2½ ft. in diameter and 2 ft. long and driven by belt and pulley from an overhead shafting. To effect the grinding, two steel rollers each 18½ in. long, and sawn from a length of steel shafting 5½ in. in diameter were placed loosely in the mill. These cylinders were in use for the first time on the occasion of the explosion and were replacing old wrought iron rollers which had become worn. It is possible that the use of these new and heavier rollers which had sharp ends were instrumental in starting the explosion. It was the usual practice to add salt to this dye before grinding, but this was not done in this case.

A fatal accident occurred at the works of the British Thermit Co., Ltd., at Garston, Liverpool, on October 21, when one man was killed and two were injured. The men were engaged in mixing copper oxide, aluminium, lime and fluorspar by means of iron shovels on a floor covered with iron plates, when the mixture fired and exploded with a loud report. The ingredients were scattered and severely burned the men and one died from his injuries. The material damage was small and a similar mixture had been made about two hours previously without accident. The mixture is regularly made and the usual practice is for the ingredients to be thoroughly dried and warmed on a hot plate. In collaboration with the Factory Department, samples of the ingredients were procured and submitted for examination, when it was found that the mixture, if allowed to become completely cold, is not specially dangerous, although it can be ignited by a sufficiently violent blow; but that if the mixture is even slightly warm the risk of ignition by friction is greatly increased. Fine material, especially aluminium, forms more dangerous mixtures than coarser material. The following recommendations were therefore made:—(1) The use of iron and steel implements for mixing this composition should be prohibited, brass, aluminium or wooden implements being preferable; (2) the ingredients should be allowed to cool down completely before mixing is performed; (3) any material finer than 60 mesh 1 m.m. should be sieved out from the aluminium before use; (4) the platform on which the ingredients are to be mixed should be thoroughly dry and clean.





### A Modern Fine Grinding Installation.

*This illustration shows an installation of four Sturtevant Ring Roll Mill Grinding Units at a gramophone factory. These units combine air separation plants with dust collecting systems. The fineness of the finished product is 200 mesh. The mills are directly connected to geared motors through flexible couplings, economising space and saving power. The plant works twenty-four hours per day, for six days per week. The grinding capacity of each unit is from twelve to one hundred tons per twenty-four hours, depending on the nature and ultimate fineness of the material. The photograph was taken under working conditions, and shows the cleanliness of the plant.*

*(Reproduced by courtesy of the Sturtevant Engineering Co. Ltd., London.)*

## Prospects of Russian Oil Exports

### The Five Year Plan

THE Birmingham Bureau of Research on Russian Economic Conditions (Russian Department, University of Birmingham) has issued a memorandum on the operation of the Five Year Plan, in which it estimates the probable consumption of oil products by the end of the first Five Year Plan.

At least 24 million tons of crude oil must be provided out of the total output of the U.S.S.R. oil fields. Thus the original plan for the oil-refining industry, which was based on a 1933 crude oil output of 21.7 million tons, is seen to be far behind the requirements of the internal market alone. On the other hand, the maximum plan, based on an output of 40 million tons in 1933 appears to be quite utopian.

Indeed, the oil production for 1932 was planned as 35 million tons, but this estimate has had to be revised and the plan of production reduced to 27 million tons; for the following year, assuming the most favourable circumstances, an output of 30 million tons may be expected. The production

plans for 1932 will probably remain unfulfilled, as during the first quarter, the increase was only 10.6 per cent. against the 22.9 per cent. planned. Moreover, the capacity of Soviet refineries can hardly attain 30 million tons and will probably tend to lag.

Assuming, then, that the output of crude oil in 1933 will not exceed 30 million tons, the total of oil products will be 28 million tons, of which at least 22.6 millions will be required for the internal market and only 5.4 millions can be exported—exactly the quantity exported in 1931. The Bureau is therefore inclined to conclude that, in the period under consideration, the inevitable increase in internal consumption due to the policy of industrialisation and collectivisation will limit the possibilities of increase of oil exports from the U.S.S.R.

Should, however, an acute need of foreign currency arise, the Soviet Government might find itself forced to increase oil exports, but such a course would be contrary to the provisions of past and present plans in regard to the requirements of agriculture and industry.

## Acid and Alkali Manufacture in Scotland

### Effect of Depression in the Iron Trade

IN the 68th Annual Report on Alkali, etc., Works, which was reviewed in *THE CHEMICAL AGE*, July 2, pages 7-8, special reference is made to the manufacture of acid and alkali in Scotland. The number of works registered during 1931 was 125, a decrease of twelve as compared with 1930. Of the latter, eight were coking plants which ceased operations owing to the closing down of iron works; three were due to the suspension of the manufacture of sulphate of ammonia in gas works, and the closing of the remaining one, an acid works, was due to the concentration of manufacture in other places.

#### Sulphuric Acid Manufacture

The production of sulphuric acid by the chamber process was only 63 per cent. of the output of 1930 and 54 per cent. of that of 1929. Part of this decrease is due to the decline in ammonium sulphate manufacture in gas works and iron works, but is mostly attributable to the general trade depression. Acid produced by the contact process has also decreased somewhat in amount, but it does not show the same large fall, the figures being 94 per cent. of the output for 1930 and 89 per cent. of that of 1929. The ammonia oxidation method of supplying oxides of nitrogen to the chamber process for acid manufacture continues to give every satisfaction and has been largely adopted. This method is also being used on the large scale for the production of nitric acid and is working very well.

Two infractions of the Act in sulphuric acid works were discovered, but in general the escape of noxious gases from chamber outlets and chimneys has been maintained at a low figure. The average escape from chamber plants was 0.57 grains of acidity expressed as sulphuric anhydride per cubic foot of residual gas. In concentration plant exits (Class II) the average escape was 0.51 grains. Contact process manufacture has been continued satisfactorily but the average escape is somewhat higher, being 1.01 grains of acid per cubic foot against 1.05 grains a year ago. This increase is entirely due to one unit, the catalyst of which has been losing efficiency; it has a platinum packed converter and to replace the latter a new unit has been erected and was to be put into operation at the end of 1931.

#### Chemical Manure Works

The consumption of raw materials for fertilisers has shown an increase of about 2½ per cent. as compared with last year, but a substantial decrease on the 1929 figure. The latter was, however, rather higher than usual, the average for the five years 1925 to 1929 being about 49,000 tons. The 1931 figure of nearly 48,000 tons compares favourably with this average. The fertiliser industry in Scotland is a seasonal trade, manufacture of superphosphate commencing in the autumn and continuing until the following spring, when it is suspended for the summer. The 1931-32 season has opened well. Owing to the fall in the value of sterling abroad a good deal less foreign manufactured superphosphate is being imported, causing more work for the home industry. Condensation in the various wash towers has been generally good, the average being 98.65 per cent., whilst the average escape, after scrubbing, was 0.065 grains of acidity per cubic foot of exhaust gas expressed as the sulphur trioxide equivalent of hydrofluosilicic acid.

#### Sulphate of Ammonia

During the year a severe decline has taken place in the manufacture of ammonium salts in Scotland. The very low price for ammonia products now ruling has made the position of the small manufacturer increasingly difficult. Gasworks, coke ovens and other producers of ammonia, who in the past have been making a reasonable profit from the isolation of ammonia, are faced with the alternative of shutting down their plants and wasting the ammonia, or continuing to manufacture it at a financial loss. The disposal of ammoniacal liquor in other ways than by the formation of salts is a difficult matter. It has been suggested that the liquor be disposed of by using it to quench coke, but there are obvious disadvantages to this method. Unless it is

carried out in a properly constructed tower (which adds to capital cost and maintenance charges of the plant) atmospheric pollution is almost certain to result. A second suggestion is that the liquor might be used instead of water on producer bars; this would destroy the whole of the ammonia and other objectionable gases but would deal with a comparatively small amount of liquor.

#### Shale Distillation

Manufacture of sulphate of ammonia and the distillation of tar in iron works have also fallen to negligible proportions and reflect the intense depression of the iron trade in Scotland. From being a large and flourishing industry it has almost entirely disappeared, and in the Glasgow district one can see dozens of blast furnaces standing idle, many of them apparently falling into disrepair. The fall in production of ammonia and tar in coke ovens is another indication of the state of the iron industry. Sulphate of ammonia produced in shale works has shown a decrease of some twelve per cent. compared with 1930. This is due to the closing of some of the shale mines on account of the impossibility of maintaining economic production so as to compete with the present low price of motor spirit and other petroleum products. Work has been suspended at the Oakbank Refinery and at two other smaller plants. The distillation of shale has decreased considerably in recent years, but it is still quite a large industry in the Lothians. It cannot, in view of the comparatively low oil content of the raw material and the necessity for distillation to recover the oil, compete with imported petroleum, but the present petrol tax, which does not apply to shale spirit, has given it some measure of protection.

## Professor J. W. Hinchley

### Memorial Tablet Unveiled

A MEMORIAL to the late Professor J. W. Hinchley, professor of chemical engineering at the Imperial College of Science and Technology, founder and first chairman of the Chemical Engineering Group and founder and hon. secretary of the Institution of Chemical Engineers, was officially unveiled in the East Cloister of the Garden of Rest at the Golders Green Crematorium on July 5, in the presence of a large gathering of members of the Institution of Chemical Engineers and kindred organisations. The memorial takes the form of a tablet in bronze, bearing the seal of the Institution and the following inscription:—

In memory of  
JOHN WILLIAM HINCHEY,  
of the

Imperial College of Science and Technology, where he was the first Professor of Chemical Engineering.

Devoted to the development of this science in England, he was an inspiring teacher and helpful friend.

This record is made by the Institution of Chemical Engineers, of which he was a founder, and by his wife, out of the esteem and love in which his memory is held.

B. 21.1.1871.

D. 13.8.1931.

This memorial is the work of Mr. Omar Ramsden.

The first Hinchley Memorial Lecture will be delivered on October 28 by Mr. H. T. Tizard, Rector of the Imperial College of Science and Technology. These lectures have been inaugurated to commemorate the long and intimate association of the late Professor Hinchley with the Institution, and will be delivered at intervals of three years.

Mr. Tizard has chosen for his subject "Chemical Engineering and the Aircraft Industry," and, after some remarks on the relations of chemical engineering to industry in general, will discuss its particular applications to the aircraft industry. The lecturer suggests that though the latter industry may seem rather remote from chemical engineering, it affords a good illustration of the interconnection of industries and enables him to discuss matters of considerable importance for the future development of chemical engineering.

## Some Special Phases of Textile Testing Papers at the Annual Conference of the Textile Institute

We give below extracts from three papers delivered at the recent Annual Conference of the Textile Institute, held at Leamington Spa. Chemical tests in the wool industries are dealt with by Mr. E. Hill, of the Wool Industries Research Association; the testing of laundered fabrics by Dr. R. E. V. Hampson, of the British Launderers' Research Association; and the estimation of chemical damage in wool by Professor P. Kraus, of the Deutsches Forschungsinstitut für Textilindustrie, Dresden.

THE various chemical tests relative to wool and its manufacture, described by Mr. Edgar Hill, were those now being employed in the laboratories of the Wool Industries Research Association. Raw wool is spread out in the humidity room kept at a standard humidity and after twenty-four hours is ready for sampling. Moisture is determined in a specially designed bottle which is heated in an electric oven. Grease is estimated by extracting 20 grams of dried wool with dry benzene in all-glass Soxhlet apparatus. The extracted grease is examined for traces of suint, which are removed by washing a petroleum ether solution of the extracted grease with 50 per cent. alcohol. Suint is removed from the benzene extracted wool by Soxhlet extraction with water, and the percentage of suint is determined from the dried aqueous extract plus the trace of suint obtained from the grease. For dirt the extracted wool is dried and weighed, then washed in warm soapy water and finally in plenty of warm water to get rid of dirt, care being taken to avoid fibre loss. The vegetable matter is hand picked from the wool and the clean wool is then dried and weighed, the amount of dirt being estimated by difference.

Microscopic examination shows the wool fibres to consist of a thin external layer of scales adhering to a solid central cortex which constitutes the main body of the wool. Chemical analysis reveals wool to contain carbon, hydrogen, oxygen, nitrogen and sulphur together with a small amount of inorganic matter. Wool protein or keratin is of a complex but unknown composition, but when it is treated with certain hydrolysing agents, which open up the protein molecule by the addition of water molecules, a number of substances result. The chemical constitution and quantity of these hydrolysis products is known. They are found to be amino acids which therefore possess amphoteric properties, i.e., uniting with acids in acid solution and with alkali in alkaline solution. Wool possesses amphoteric properties and the acid or alkali taken up by the wool has a great influence on its swelling, power of attracting moisture and its behaviour throughout the various processes from the raw material to the finished article.

### Estimation of Alkali in Wool

On the basis of the amphoteric properties of wool, Hirst and King have devised a method for the estimation of alkali in wool. Terephthalic acid, which is a stronger acid than soap acids but which has a very low solubility, is used (at 20° C., 1 litre of water dissolves only 0.0168 grams of this acid, less than 2/1,000 per cent.). The sodium salt, however, is very soluble in water and is not decomposed by CO<sub>2</sub>. On adding excess of this acid to wool, the alkali present is converted into the soluble sodium salt of the acid; the wool becomes acid, and the sodium terephthalate is then free to diffuse through the solution. The terephthalic acid is used merely as a vehicle for the extraction of alkali from the wool and the amount of this acid taken does not enter into the calculation.

The presence of alkali in wool is found to have an effect on dyestuffs. King has shown that certain azo dyes which normally are unaffected by sulphur dioxide in the presence of acid, are seriously affected if the wool or yarn dyed material is alkaline when finished. The extent of the change depends upon the amount of alkali in the wool since the more alkaline the wool, the greater is the amount of sodium hydrogen sulphite formed, with the consequent production of the bisulphite compound of the dye. With sulphur dioxide (H<sub>2</sub>SO<sub>3</sub>) alone there is no reaction in the acid range, but as the percentage of alkali increases, we see there is a point about pH 7 where the maximum formation of the bisulphite compound occurs. These compounds possess a different shade from the original dyestuff, are more soluble and fade much more easily than the original dye.

When an unknown sample is submitted for analysis, it is first necessary to extract with petroleum ether to remove oil

as such. This oil should be examined for soap and if present should be determined. The wool is then extracted with alcohol to remove the soap, and it is found that extraction with alcohol gives excellent results. Before use the alcohol should be re-distilled and neutralised and all operations should take place in glass vessels. Since neutral soap is "caustic" to wool and as scouring with neutral soap alone is not practised in the majority of scouring processes, there will be obviously an absorption of alkali by the wool.

### Fluorescence Tests for Oils

For oil testing the usual standard methods of oil analysis are employed, but it may be of interest to note that for the determination of iodine values, although Wij's solution is quite satisfactory for routine work, in special cases where oxidation has occurred or in the case of wool grease, it is preferable to use Hübl's solution, for the following reason. Holde found on using Hübl's solution, that cholesterol gave an iodine value of 73 to 77 (65.7 theoretical) and phytosterol 41 to 76 according to the time given for the reaction, but with Wij's they gave the value of 135 for both, which is approximately double the theoretical value.

The effect of ultra-violet light and the use of the fadeometer have been found by Hirst to be of service for testing both samples of oils and pieces for spots of oil, and also to account for the development of stains in dyeing. A highly unsaturated oil or one containing unsaturated impurities shows, under ultra-violet light, an intense fluorescence on the surface of the oil, the deep penetration of the light being prevented by the screening effect of the unsaturated material. If the oil be diluted with non-fluorescing purified paraffin or petroleum ether, a value may be obtained by dilution at which the fluorescence extends downwards throughout the whole of the oil. Mineral oils give a yellow to brown stain when subjected to sunlight or to the fadeometer and show with ultra-violet light a fluorescence from blue to white respectively. Highly purified mineral oil such as medicinal paraffin gives no stain on exposure to sunlight or to the fadeometer, and shows no fluorescence with ultra-violet light. A typical American spindle oil gave a blue fluorescence and on being exposed for 175 hours in a quartz tube to the fadeometer, a brown precipitate formed which was insoluble in petroleum ether, whilst the fluorescence was then seen to have changed to white. Vegetable oils give varying shades of fluorescence from blue to yellow but usually a blue. Cotton seed oil after twelve days' exposure in a quartz tube to the fadeometer gave a yellow fluorescence and after six weeks, no fluorescence. As would be expected the iodine value of the oil decreases with time of exposure and the viscosity of the oil increases.

Spots of mineral oil on cloth show a blue fluorescence, and on being submitted to sunlight or to the fadeometer or for a much shorter time to steaming in air, oxidation takes place. On subjecting the cloth to a light scour and then dyeing, it is found the spot now appears to be darker in shade than the remainder of the piece, indicating a greater penetration of dyestuff or increased dyeing affinity at the spot. Spots of vegetable oil on wool do not exhibit pronounced fluorescence because this is similar to the fluorescence of the wool. On being exposed to sunlight or the fadeometer or for a shorter time to the action of steam in air, oxidation occurs and the spots resist the action of a light scour. On dyeing the cloth, the spots appear to be of a lighter shade than the remainder of the piece.

### Estimation of Sulphur and Nitrogen

There are two chief methods for the determination of sulphur in wool. These are based on the oxidation of sulphur to sulphate and the simultaneous destruction of the organic matter. The methods are as follows: (1) the Carius method, which is found to be excellent, the chief disadvantages being the labour in sealing the tubes and the cost; (2) the Benedict Denis method, which is rapid but there is a danger of losing material during the ignition and not only is it necessary to



use high class chemicals, but also duplicate blank determinations should be made on the reagents.

The Kjeldahl method is quite satisfactory for nitrogen estimation, but 1 per cent. sodium carbonate scour on New Zealand wool causes an increase in the nitrogen content of 0.25 per cent. calculated on the wool or an increase of 1.50 per cent. of the total nitrogen. Two per cent. sodium carbonate scour on black alpaca has increased the nitrogen content by 0.37 per cent. calculated on the wool or 2.33 per cent. of the total nitrogen. This indicates the removal of a soluble portion of lower nitrogen content than the original wool by this alkaline treatment.

### Laundered Fabrics The Investigation of Complaints

The examination of fabrics exhibiting failure after laundering presents a much more complex proposition than the examination of new goods, either in the process of manufacture or immediately afterwards, for in dealing with new articles, however many points the examination must cover, there is never a doubt that the cause of any defect must lie somewhere in the process of manufacture. In the testing of laundered fabrics, however, there are at least three possible sources of failure or complaint which must be considered. Such may have its origin in manufacture, it may be the result of something which has taken place in use or storage, or again it may be the result of the laundering treatment, but, as pointed out by Dr. R. E. V. Hampson, who dealt with "The Testing of Laundry Fabrics," in many cases definite conclusions cannot be reached owing to lack of evidence.

For purposes of discussion it is convenient to analyse the causes of failure and these fall roughly into one or more of the following main groups, each of which may of course be sub-divided almost indefinitely:— (1) Cases involving a loss of strength. This group may contain all cases from complete rupture of the fibres on the one hand to cases where only a slight tendering is shown. (2) Cases in which an alteration in size has resulted. This group would include cases of true shrinkage, of felting of woollens, of elongation in one direction, and all cases of distortion in shape. (3) Cases in which colour is concerned, familiar examples of which are fugitive nature of the dye employed, the effect of light on dyes, the effect of dyes on the strength of fabric and others of a similar character.

#### Loss of Fabric Strength

An interesting example coming under the first grouping concerned a number of shirts of the same manufacture which developed breaks in several places during the first washing process. Fortunately it was possible also to secure a sample of the new unwashed material for comparative tests. The bursting strength of the shirt as received after one wash was 53 lb./sq. in. when dry, and only 25 lb./sq. in. when wet. Clearly the cause of failure was the weakness of the material in the wet state. A similar examination of the new material showed a fall in strength between the dry and wet states from 101 lb./sq. in. to 65 lb./sq. in., and after one gentle washing process the figures were 63 lb./sq. in. dry strength and 29 lb./sq. in. wet strength. Not only do these figures indicate a large fall in strength between the dry and wet states, but also an enormous fall in strength as a result of a single gentle wash. An examination of the fabric in cuprammonium solution showed that 77 per cent. of fabric strength had been lost owing to chemical action. A similar examination of the sewing cotton used in making up showed only 1 per cent., indicating that the over-bleaching had taken place during the manufacture of the fabric and before the garment was made up. But whilst dry and previous to washing, the effect of manufacturer's bleach was unnoticeable, the weakness due to the treatment received became apparent after wetting, and still more so after washing.

#### Shrinkage and Dye Troubles

Regarding cases which fall into the second group, it should be pointed out that shrinkage is not confined to goods containing wool. Very many textiles are capable of being stretched when wet and if dried in this state the stretch becomes set, but on subsequent wetting the set disappears. In some cases shrinkage only takes place in one direction and

actual extension may take place in the other. Complaints regarding washing frocks arising from this cause are by no means infrequent. Then there is the very different phenomenon of the felting of wool, often erroneously described as shrinkage. Microscopic examination of the wool fibres in cases of complaint concerning the behaviour of unshrinkable wool often reveals incomplete chlorination. Another interesting case examined recently concerned an example of preferential shrinkage of the coloured stripes in a suit of pyjamas. Here also it was possible to obtain a sample of the new material. Microscopic examination of the fibres did not indicate any particular difference in the degree of chlorination of the different colours, but whereas the average twists of the cream yarn was twelve per inch, the average of the coloured yarn was twenty per inch. This easily accounted for the different behaviour of the stripes and the waviness which became apparent as soon as the new material was wetted.

In the third group of complaints it is perhaps hardly necessary to give instances. Cases in which colours have "run" in the wash; cases of "marking off" on other goods washed in the same load; cases in which a hot iron has brought about a colour change, are familiar to everyone. There are others, perhaps not quite so frequent, but none the less giving cause for complaint. It is not by any means unusual to hear of a colour which changes completely on coming in contact with a soap solution. In some cases the original colour is restored on treatment with acid. Such colours must necessarily be affected by a washing process using soap and alkali. Then again the influence of the dye on the fibre is important. Though instances of the destruction of the fibre by the action of the dyestuff are now rare, others in which the dyestuff accelerates the action of light are very frequent. Curtains with a dyed pattern or border exhibit this to a marked degree.

### Chemical Damage in Wool Its Detection and Estimation

To be able to estimate the amount of damage which is done or may be done to the wool fibre during the various alkaline, acid, reducing and oxydising processes, it has to undergo during the manufacture of fabrics of any kind, has been a matter of importance for a long time. Very numerous proposals have been made in this direction including colour reactions, the action of chlorine water, the coupling with diazo compounds, the estimation of soluble nitrogen, the biuret, sulphide of soda, bichromate and others. Colour or chemical reaction, however, must be corroborated in full detail by mechanical tests, since it is not the chemical behaviour but the mechanical strength and elasticity, which count in the practical use. Nevertheless, it was pointed out by Professor P. Krais, of Dresden, in his paper on the "Detection and Estimation of Chemical Damage in Wool" that there are chemical damages, especially by alkali, which do show in the amount of soluble nitrogen, but have no effect upon the mechanical properties, unless an acid treatment such as dyeing at the boil with sulphuric acid or bisulphate, has followed. These latent faults are, of course, very tricky. They do not show if you test the fibre mechanically in the dry state, but they show strongly in the wet state, the strength of the yarns as well as of the single fibres being considerable affected. The total nitrogen contents are first determined by the Kjeldahl method, and then small quantities of the original and the treated samples are kept in a solution of alkali and hydrogen peroxide for three days, then filtered, washed, the filtrate acidulated and kjeldahled. The nitrogen going into solution (in form of ammonia, aminocarbonic acids, etc.) is calculated in per cent. of the total nitrogen. In a fine wool about 4 to 5 per cent. soluble nitrogen is found in the original; in damaged wool a rise up to 32 per cent. and more is indicated.

#### Sulphuric Acid in Japan

JAPANESE exports of sulphuric acid during the last three years were as follows: 1929—5,500 metric tons; 1930—4,900; and 1931—6,600. Production of sulphuric acid by 134 plants for the year ending March 31, 1931, totalled 1,044,000 metric tons, chiefly for fertiliser manufacture. Of these, 10 produced fuming acid, 40 chamber acid, 69 produced a grade above 65° Bé and 15 a grade under 65° Bé.

## New Industrial Uses for Cane Sugar

By GERALD J. COX and JOHN METSCHL

THE following contribution from the Sugar Fellowship of the Mellon Institute of Industrial Research was presented before the Division of Sugar Chemistry at the recent annual meeting of the American Chemical Society, at New Orleans. The authors are Industrial Fellows of Mellon Institute.

THE establishment of the Sugar Fellowship at Mellon Institute of Industrial Research in October, 1930, represents probably the first organized effort to find industrial uses for refined cane sugar. There have been sporadic attempts by refiners and chemists to adapt this very attractive material to uses other than food, and certain successes have been recorded. Vivien ("Bull. assoc. chem. suc. dist.," 1912, 29, 421, 497) and Rolfe ("Chem. News," 1913, 107, 217) have reviewed the uses to which sucrose had been put about 1912. These uses included sugar in transparent soaps, explosives, tanning materials, dyes, leather, printers' rolls, hectograph pads, and pharmaceutical preparations. During the world war sugar was advanced as an antiseptic agent in the treatment of wounds. The chemical properties of sugar have been used in removing lime from hides after dehairing and in dissolving lime as monocalcium saccharate from certain minerals. Powell (U.S. Pat., 1,297,491) has proposed to treat wood by impregnation with sugar solutions. He claims that his process prevents shrinkage and season checking and protects against the attacks of termites. Rice (U.S. Pat., 1,527,330) advocates the same usage and makes extensive claims for the value of his treated woods.

A variety of uses have been made or proposed for derivatives of sucrose. Calcium saccharate is employed in whipping cream and in ice cream. Copper saccharate has been advanced as an insecticide. Sucrose octanitrate appears in mixtures of nitrated glycol and glycerol. Vivien believed that sucrose acetate could replace cellulose acetate and that sucrose benzoate might have similar uses. Sucrose has served as a substrate in numerous investigations of the products evolved by microorganisms. A noteworthy achievement in this field is the commercial production of citric acid from sucrose by mould action ("Chem. Bull.," Chicago, 1931, 18, No. 2, 35), and oxalic acid derived from sucrose by fermentation will soon be produced commercially. Sugar has been employed in the preparation of plastics and has been reported recently as a base of a resin for which a wide variety of claims are made ("Plastics," 1931, 7, 448).

### Sucrose Esters

Investigations carried out under the Sugar Fellowship fall into three classes: sucrose derivatives, degradation products, and direct uses of the sugar. Sucrose, owing to its lack of reducing power, may be regarded as a sugar alcohol and subject to such treatment as glycerol or mannitol. It differs, however, from the sugar alcohols in being hydrolysable into its monosaccharide constituents with a consequent change in properties. The reactions of esterification and etherification naturally suggest themselves, and we have made derivatives of both types and examined some of them for possible applications.

From a cost standpoint the acetates of sucrose attracted early attention, and sufficient quantities of the octaacetate were prepared for distribution among other fellows of Mellon Institute for trial in their various problems. Sucrose was first acetylated by Schützenburger ("Comp." rend., 1865, 61, 485) in an investigation that produced the first cellulose acetate. The octaacetate can be obtained readily in 90 to 95 per cent. of the theoretical yield by treatment of sucrose with an excess of acetic anhydride, with sodium acetate as a catalyst. It is a crystalline substance melting at 71° C. and beginning to decompose at about 285° C. Because of its high viscosity at the melting point, it does not resume crystalline form on cooling, but remains a glass. It is only slightly soluble in water (0.14 per cent. at room temperature), but is soluble in organic solvents generally, except petroleum hydrocarbons and fats. It has an exceedingly bitter taste, as between 0.001 and 0.002 mg. can be detected in 1 c.c. of distilled water.

The glassy or resinous characteristic of fused sucrose octaacetate promptly indicated its use as a gum constituent of lacquers, as a plasticiser, and as an ingredient of anhydrous

adhesives. It has been employed successfully in the treatment of paper. Sufficient promise of a large application of sucrose octaacetate has brought its production to a semi-commercial stage, in which it is being produced in 50 lb. lots with a view to large-scale production as soon as the processes utilising it are perfected. Another ester derivative of sucrose is that of benzoic acid, made by the Schotten-Baumann reaction. The octabenzoate is a non-crystalline solid resembling the sucrose octaacetate, but tasteless and less soluble. Lower benzoates approximating the pentabenzoate tend toward a more crystalline nature.

### Levulinic Acid and Esters

Of the degradation products which may be made from sucrose, the most interesting is levulinic or  $\beta$ -acetyl propionic acid. Thomas and Schuette ("J. Amer. Chem. Soc.," 1931, 53, 2,324) have shown that it can be obtained in 42 per cent. of the theoretical yield by autoclaving sucrose with 6.5 per cent. hydrochloric acid for one hour at about 160° C. By-products, formic acid and the so-called humic acid, are produced. The formic acid is molecularly equivalent to the yield of levulinic acid. Methyl, ethyl, and butyl levulinates have been prepared with a view to studying their utility. These esters are rapid solvents of nitro-cellulose.

Among the direct applications of sucrose the ancient use of sugar in lime-sand mortar is considered to be the most promising for a successful use of large amounts of sugar. Mortar possesses certain qualities of workability that are superior to cement mixtures or gypsum plasters, but it is lacking in strength. Lime mortar can regain many of its former uses if its strength can be increased. Experiments to date have consisted of tests of tensile strength of lime-sand mortar with and without the addition of cane sugar. The mix employed was as follows: Lime putty was made by mixing 1 part of quicklime and 2.75 parts of water by weight. The lime putty was then aged at least 24 hours, but generally much longer. The experimental amount of sugar was next added in 0.25 part of water and 3 parts of 20-30 mesh standard Ottawa sand, and the moulds were filled at once. The sugar content was varied from 0 to 12 per cent. of the quicklime in 1 per cent. stages. The briquettes were removed from the moulds after 48 hours, with the exception of those containing 9 per cent. sugar or more. These latter mixtures were progressively more fluid than those of lower sugar content and required longer drying in the moulds. It is believed, however, that a reduction in the proportion of water would have stiffened these mixtures to the same consistency as the controls, without materially altering the final tensile strengths. Variations of tensile strength occurred in some of the early mixes, owing to improper slaking of the lime and perhaps to variations in the final mixing. The data obtained, however, points definitely to an increase of about 60 per cent. in tensile strength with the addition of sugar amounting to 6 per cent. of the quicklime. On the basis of the experiments completed, the addition of 6 lb. of sugar per 100 lb. of quicklime, or 4.5 lb. per 100 lb. of hydrated lime is recommended for use. The lime must be slaked and cool before the sugar is added. The proportions of sand and water may be varied as desired.

### German Coal Tar Products Situation

THE 6,000,000 tons of stocks held on hand by the German coke industry has led to curtailed output, with tar and pitch production falling to such a level that some doubt is expressed as to its ability to make its usual exports to European markets. This is expected to improve the demand for American pitch in the markets. The German market for road tar has become more highly competitive, creosote oil demand has fallen sharply, but exports of naphthalene are fairly stable. Anthracene residues and benzol are also adversely affected by conditions, but cresol is selling fairly well.

## The Aftertreatment of Sulphur-Dyed Textiles

By JOHN L. CRIST

This paper by the Southern Manager of the Calco Chemical Co., Charlotte, N.C., was presented at a recent meeting of the South-Eastern Section of the American Association of Textile Chemists and Colourists.

THERE are ordinarily three somewhat related, yet nevertheless distinct, purposes that are sought after in aftertreatment. These are, for the purpose of convenience, enumerated as (a) aftertreatment to develop the shade, (b) to improve fastness, (c) to prevent tendering.

Aftertreatment to develop the shade is of necessity principally a process of oxidation since, as we all know, the dyestuff is attached to the fibre in the reduced state, and is subsequently oxidised either by blowing warm air through the fibres or by means of chemical action. This oxidation from the reduced state is one which progresses naturally and may require days, months, or even years to reach completion unless hastened by chemical means. To speed up this oxidation and to reach the ultimate point of shade development is the reason for an aftertreatment by chemical means. This is ordinarily accomplished by the use of sodium perborate, hydrogen peroxide or sodium bichromate together with acetic acid. Possibly the most commonly used oxidising agent at present is sodium perborate. Assuming that the sulphur dyeing has been washed reasonably free from sodium, then  $\frac{1}{2}$  per cent. to 1 per cent. of sodium perborate, or the equivalent of this quantity of hydrogen peroxide together with  $\frac{1}{2}$  per cent. soda ash is ordinarily sufficient to completely oxidise the shade. This oxidation is carried out at about 120° F. for 10 to 15 minutes, after which the goods are given one rinse, extracted and dried. Sodium bichromate and acetic acid are sometimes used to accomplish this chemical oxidation. However, the treatments with perborate, peroxide, etc., have proven to be more easily controlled and more foolproof and in the case of raw cotton are distinctly more advantageous since the development with bichromate and acetic acid leaves the raw cotton in a state that renders it very difficult to card and spin.

The chemical change which takes place in this oxidation process is somewhat obscure. This is owing to the well known fact that most sulphur dyestuffs are composed of various related chemical compounds, the composition and portions of which have not been determined. It is quite certain, however, that in this oxidation process the dyestuff molecules themselves undergo some change since we know in some instances the fastness properties are altered by the after-oxidation. This is particularly true in some of the Sulphur Yellows and Sulphur Greens. If the artificial oxidation is properly carried out there is no further natural oxidation which takes place and the dyer can rest assured that the final shade produced in his dyehouse will not be further changed by the natural process of oxidation. This is quite naturally a distinct advantage in matching shades that have been dyed for some period of time.

### Aftertreatment for Improved Fastness

This aftertreatment is normally carried out on yarn and piece goods since this aftertreatment leaves raw cotton in a state that it is very difficult to card and spin and for this reason is not applicable to cotton in the unspun state. The commonly accepted aftertreatment for this purpose is sodium bichromate and acetic acid or copper sulphate and acetic acid in one solution. The aftertreatment with sodium bichromate is intended not only to develop the shade through oxidation but also to improve the fastness to washing. The aftertreatment with copper sulphate is intended to improve the fastness to light. The reason for the improvement of fastness properties to both washing and light by this aftertreatment is somewhat obscure. It is the consensus of opinion, however, of those who have made a study of this subject that the improvement in fastness properties is due to the formation on or in the fibres of chromium and copper lakes with the molecule of the sulphur dyestuff. This is certainly a chemical reaction between the chromium and the copper salts and the sulphur dyestuff. Generally speaking, the sulphur colour, the shade of which is changed to the greatest extent upon aftertreatment with copper, chrome and acetic acid, will be found to be the colour which is improved in its fastness properties to the greatest extent and vice-versa.

The concentration of the aftertreating solution is varied in different plants to accomplish the improvement desired and to conform to the individual requirements of each set of conditions. The following table will indicate the proper concentration (per 100 gallons) and temperatures of solution to effect either mild or severe aftertreatment by passing the goods through these solutions at the indicated temperature:—

	Mild.	Severe.
Sodium bichromate ... ..	5 lb.	20 lb.
Copper sulphate ... ..	5 lb.	20 lb.
80 per cent. Acetic acid ... ..	5 lb.	20 lb.
Temperature ... ..	120° F.	160° F.

Before the dyed goods are entered into this solution they should be thoroughly washed to remove most of the sodium sulphide, otherwise the aftertreating bath will be contaminated by the precipitation of copper sulphide. After the goods are passed through this solution they should be thoroughly squeezed and washed before drying. The fastness properties of many sulphur dyestuffs are greatly improved by this aftertreating procedure. For this purpose it is rarely necessary to aftertreat Sulphur Blue and Sulphur Black dyeings as the self shades usually possess sufficient fastness. Some Sulphur Greens and Bordeaux change shades so greatly on aftertreatment that it is not advisable, as slight changes of temperature and concentration of the aftertreating bath will result in uneven results. After sulphur dyed fabrics are properly aftertreated as above there is no further shade change on oxidation or natural development, on storing or wearing.

### Aftertreatment to Prevent Tendering

It has long been known that goods dyed with sulphur colours are liable sooner or later to lose considerable tensile strength. This may occur during any of the various processes immediately following the dyeing operation or the tendering may develop gradually in storage after the goods have been finished for several months. The cause of tendering has received much thought and study and it is generally accepted to be due chiefly to the formation of sulphurous and sulphuric acid, caused by the oxidation principally of the sulphur compounds in the colour molecules or in less degree to the oxidation of sodium sulphide or sulphurous acid left in the goods after dyeing. The methods commonly recommended for overcoming the tendering action resulting from this oxidation depend either upon the use of oxidising agents or upon an aftertreatment with salts capable of neutralising free mineral acid, or upon an aftertreatment with substances that will prevent subsequent oxidation.

The product most commonly used for oxidation is sodium perborate together with soda ash. The normal procedure is, after the cotton has been dyed and thoroughly washed, to aftertreat with approximately 1 per cent. sodium perborate and  $\frac{1}{2}$  per cent. soda ash, starting the bath cool and gradually increasing the temperature up to 160° F. The goods are then immediately extracted and dried with or without rinsing. This process not only oxidises to completion the sulphur and the partially reduced sulphur compounds in the dyestuff molecule in the harmless alkaline state but it leaves the goods slightly alkaline as an additional safeguard against the development of sulphuric acid. This process is very simple and one which the speaker has never known to fail. If the sulphur and sulphur compounds are completely oxidised to alkali sulphate, there is no possibility of subsequent formation of sulphuric acid.

A second process sometimes used depends upon impregnating the goods with an insoluble calcium salt which reacts with the ultimate sulphuric acid as it is gradually produced and in that way provides a permanent method of preventing the tendering of dyed goods. The process consists in treating the dyed goods either with a very finely divided insoluble calcium salt, such as carbonate, or with a very weak solution of tannic acid and subsequently with a solution of lime water, washing and drying. This process is only to be used on material to be given a hard and stiff finish. An additional method of aftertreatment to prevent tendering consists of the



use of glucose in the finish. This glucose, being a reducing substance, prevents subsequent oxidation of the sulphur compounds to sulphuric acid.

A correction method that has formerly been rather widely used consists in aftertreating with a sodium acetate. The theory back of this practice is that sodium acetate, being an alkaline salt, would be decomposed by sulphuric acid formed and result in the formation of harmless sodium sulphate and

acetic acid. It is noted that the aftertreatment for developing the shade with sodium perborate and soda ash is identical with the aftertreatment with these two compounds to prevent tendering. Where it has been determined there is no serious loss of wash fastness by this procedure, it is a very desirable step and one which will be more widely used once its merits are fully realised, since in one process the shade is developed and tendering prevented or the hazard greatly reduced.

## Constitution of Colloidal Gold

### Investigations by Wolfsang Pauli

A SHORT time ago in the "Chemisch-Physikalische Gesellschaft" Wolfsang Pauli reported on the latest developments in his important work on colloidal gold. Pauli contrasted with special emphasis the old view, according to which a colloid owes its charge to the adsorption of ions, with that developed particularly in the field of proteins, which involves ionic dissociation typical of electrolytes. According to his theory, all so-called electrocratic colloids which owe their stability in solution to the presence of an electric charge show the same general structure. Thus, the colloid consists of an inner, insoluble neutral part—for example, ferric hydroxide—to which a real ionisable Werner complex is attached. The colloid particle owes its electric charge, and hence its stability in solution, to this complex or a large number of such complexes. This theory, which has hitherto been successfully applied to a number of technically important colloids, such as colloidal silica, dyestuffs, etc., not to mention glue and other protein materials, in the future, no doubt, will yield many other results of importance in colloid technique.

In the controversial and especially important field of the noble metal sols, Pauli is now able to demonstrate the validity of the theory of adsorbed ionogen complexes. According to an article which appears in the News Edition of "Industrial and Engineering Chemistry" (June 20), he has shown that colloidal gold consists of a metal nucleus, to which are attached negative complexes containing gold, aurates, or complex acids of gold, the latter being an essential part of the colloid system. This is contrary to the view of the classic investigator of gold colloids, R. Zsigmondy, that colloidal gold consists of metallic gold alone and owes its charge to the emission of gold ions after the fashion of a Nernst electrode, or to the adsorption of ions, as hydroxyl ions, on the gold surface. Furthermore, Pauli has found that colloidal gold shows a series of reactions which do not belong to metallic gold. Nevertheless, with the assumption of gold-containing complexes attached to the metallic gold the facts can be brought into best agreement. In support of the existence of these complexes, he presented the indirect considerations and then the direct evidence.

#### Indirect Evidence

The gradual withdrawal of hydrogen ions during dialysis of gold sols, obtained by reduction with formaldehyde according to Zsigmondy's method, indicates that complex potassium aurate, which it attached to the metallic gold, decomposes by membrane hydrolysis into potassium hydroxide and an acid of gold which yields hydrogen ions. The order of magnitude of the hydrogen ion concentration obtained directly by conductometric titration is in agreement with the result calculated from the value of Pauli's "colloid-equivalent" (the number of gold atoms sharing a free charge) which speaks for the existence of the complex.

Furthermore, the fact that large quantities of flocculated gold gel contain neither oxygen nor chlorine has been considered in the past as a strong argument against the complex. However, its existence is again suggested since Bredig sols, which are produced by electric dispersion, are not formed in pure water, but require for their formation the presence of electrolytic products of the alkali halides, or the hydrohalic acids; that is, some substance, in this case halogen, which is able to react with metallic gold must be present. The gold compound ( $\text{AuCl}_3$ ) which is first formed reacts with the hydrochloric acid present to form complex chlorauric acids, as  $\text{HAuCl}_4$ , or their potassium salts. The reactions of colloidal

gold differ with the kind of complex formed. Whereas the gold chloride sols are insensitive to boiling and carbon dioxide, hydroxy sols,  $\text{KAu(OH)}_4$ , obtained by dispersion with potassium hydroxide, separate out and at the same time their colour changes to blue. The addition of chloride converts the hydroxy sol into a chloride sol. Mixed chloro-hydroxy sols produced by dispersion in mixtures of alkali chloride and hydroxide show a remarkable reversibility with temperature, becoming blue when warmed and red again on cooling. All these reactions would be incompatible with a purely metallic nature of colloidal gold.

#### Direct Evidence

The purest concentrated sols, purified and concentrated by means of Pauli's electric decantation (automatic purification of sol by enrichment on the anode side of the middle cell of the electrodialyser), have been further concentrated by freezing and finally coagulated. During the process the conductivity of the liquid over the separate gold gel increased to about three times that of the original sol. This fact, along with the direct detection of gold and the quantitative determination of the hydrogen ions and chloride in the liquid, has established not only the existence of the complex but, also the kind of complex responsible for the charge. The chloride complexes were at first supposed to be auric compounds. On the contrary, they have been shown to be chloroaurous acid,  $\text{HAuCl}_2$ , or its salt. This applies also to Zsigmondy's formal sol of gold. As a result of freezing out, the chloroaurous acid complexes, which are attached to the metallic gold in each colloid particle, are split into chloroauric and hydrochloric acids, which accounts for the considerable increase in conductivity observed in the supernatant solution. On the basis of the foregoing the problem of the constitution of colloidal gold can be considered as solved in principle. Sols of other noble metals—for example, silver and platinum—are, according to Pauli, built up according to a similar structural plan.

## Sterilisation of Water

### A Development of the Catadyne Process

METALLIC silver in the ionic condition appears to exercise a very effective bactericidal action on the germs which are usually present in drinking water. Various methods of introducing silver ions into water have been put forward, and an electrical method recently proposed involves the passage of the water between silver electrodes through which a very small current is continuously passing. By this method an effective number of silver ions are introduced into the water with the aid of a 3.5 milliampere current after 4.5 hours. One of the earlier methods was based upon the ability of the water to take up silver by merely allowing it to trickle over glass beads coated with a very thin layer of the metal. A suitable small scale plant consists of a 25 litre stoneware jar filled with a large quantity of silver-coated glass beads which reduces the capacity to 18 litres. The water is passed into the jar via a tube filled with silver-coated quartz fibres, and a velocity of flow of half to one litre per minute suffices for thorough disinfection. A curious feature of this catadyne process is that water sterilised in this manner can itself be used as a sterilising agent for mineral water bottles and the like. It appears that on allowing such silver-charged water to stand in a glass bottle for several hours, a proportion of the ionic silver becomes transferred to the walls of the bottle and serves to sterilise any liquid subsequently poured into it.

## The Acetylation of Cellulose

### Continental Developments

UNUSUAL difficulties had to be overcome before the large scale manufacture of cellulose acetate for the rayon and lacquer industries was placed on a sound footing. The following extracts from a recent review of acetylation technology by Dr. Fritz Ohl in "Die Chemische Fabrik" touch on recent continental developments.

THE commercial esterification of cellulose involves the reaction of cotton linters or paper with glacial acetic acid and acetic anhydride in the presence of a catalyst, such as sulphuric acid. Other suggested catalytic agents of a less energetic nature are represented by zinc chloride and sulphuryl chloride. Acetylation, according to the general reaction



has, however, been confronted with enormous technical difficulties, arising mainly from the progressive increase in viscosity of the reaction mass. Actual acetylation is preceded in turn by wetting and swelling of the cellulose. The production of a uniform acetate depends in the first place upon the adaptability of the stirring device to the change of structure in the mass, bearing in mind the necessity for uniform composition of the mass at any given stage. Other critical factors are involved in the dependence of the yield and quality of the acetate upon the temperature of the acetylation mass and the quantity of catalyst. Contrary to what might perhaps have been expected on theoretical grounds, practical experience has shown that greater uniformity and improved quality has resulted from the acetylation in 1,000 kilogram batches and upwards. The marked progress in respect of quality notwithstanding that a five-fold increase in the size of batches has taken place in the last few years has followed the design of apparatus with novel features which take into account the characteristic structural changes during acetylation. Encouraging results have followed the use of the Kombino plant (Werner and Pfeleiderer) and the columnar plant of the Société des Usines du Rhône, both of which are described.

#### The Need for an Effective Agitating Device

Both methods recognise the necessity of adapting the agitating device to the physical nature of the reaction mass. So long as the latter is still in the swollen undissolved state, vigorous kneading is necessary as any attempt at stirring would merely result in the blades of the stirrer being put out of action, and only at a later stage when a stiff mass has been produced is actual stirring at all possible. Not only is considerable power required to stir the viscous mass, but the latter also entails unusually strong construction of the stirring gear. The Kombino kneader enables the operations of acetylation, ripening and precipitation to be carried out in one plant, giving rise to the commercial acetone-soluble cellulose acetate in a single working process. It is produced in all sizes with a capacity of 5 up to 5,000 litres and consists essentially of a vat lined with a special bronze alloy and provided with a double jacket for intensive cooling or heating. It is fitted with mixing blades and kneading blades which function in a horizontal plane in the lower half of the apparatus, and with an auxiliary stirring gear of adjustable height on a vertical axis. The vertical stirrer and the horizontal kneader operate in opposite directions, thus ensuring very thorough amalgamation.

A feature of the process used by the Société des Usines du Rhône is the continual forward movement of the liquid, allowance being made for the changes in viscosity and structure of the ingredients by means of stirrers of varying strengths and construction possessing varying speeds of rotation. This device permits of the maintenance of uniform temperatures and working conditions for each phase of production. Dead space is eliminated, and continuous working is possible, while a pleasing feature from the engineer's standpoint, is the constancy in power requirement once the batch is under way. This method also enables the acetylation to be carried out in a liquid medium such as acetic acid which is a solvent for the final product. The apparatus consists of a vertical tube fitted with a central axis capable of revolving which is fitted with a series of eleven stirring paddles which rotate in a horizontal plane and are variously

shaped with a view to the most efficient agitation of the mass at different stages of its progress down the tube. The cellulose and the acetylation mixture enter at the extreme top of the plant, the finished product issuing at the bottom. The first four stirring arms are designed to deal most effectively with the cellulose at the wetting-out stage; the three stirrers in the central portion of the apparatus are of much stronger construction, while the four bottom stirrers take the shape of very strong and more or less elongated shovels. As the reaction mass passes down the tube, the increase in consistency is thus dealt with by stirrers of appropriate design.

#### Regulation of Temperature Conditions

The temperature of the mass during its passage down the tube is easily regulated by spraying the outer surface with hot or cold water which passes through specially designed sprinklers. By allowing liquids of suitable temperature to circulate in coils built into the double wall, specified portions of the apparatus can be cooled or heated as desired. Modifications in design may also be introduced: the diameter may be increased where a slow forward movement is desired and constricted where rapid movement is essential.

The constructional material used for acetylation chambers should not only be a good conductor of heat but should also be resistant to the acetylation mixture and the cooling brine. The special bronze alloy in the Kombino kneader has behaved admirably under working conditions, but its manufacture is a closely-guarded secret. One feature is the absence of pores in the casting, as these formerly led to rapid penetration of the corrosive liquids. Notwithstanding the progress in acid-proof bronze castings, even the best types cannot be fully guaranteed against corrosion, while the cost and high specific gravity are serious considerations. Acid-resistant materials of a synthetic character are consequently coming into use and are distinguished by cheapness and low specific gravity. Here again, however, but few details as to the exact composition and technique of manufacture appear to have been published.

## Slates for Roofing Purposes

#### Factors which Affect Durability

ACCORDING to a bulletin recently published by the Department of Scientific and Industrial Research (H. M. Stationery Office, Price 4d. net) the cause of deterioration in roofing slates may be briefly classified as physical, due largely to the action of water, and chemical, due to attack by the acidic constituents of the atmosphere. This bulletin describes the various types of failure, such as flaking and blistering, the formation of gypsum under the action of sulphuric acid in the atmosphere, resulting in expansion or powdering of the surface.

For the purpose of formulating laboratory tests some thirty slates comprising all grades were selected and classified as those known to possess an indefinite life, those which fail in about a decade, and those of intermediate weather resistance. It was found that water absorption affords a general indication of quality, indicating especially the poorest classes of slates, and that physical and mechanical tests, such as those for permeability, resistance to frost and transverse strength, appear to give but little information regarding weathering properties. Chemical action is probably the chief cause of deterioration and it has been found that an accurate estimate of the quality of a slate is given by the effects of the action of two sulphuric acid solutions of different strength on separate portions of the slate. Among the effects observed in the test are lamination and swelling, accompanied by softening and blistering. A further safeguard is obtained by rejecting slates which absorb moisture abnormally. This test has been put forward by the Building Research Station as suitable for incorporation in standard specifications for roofing slates.

## Vibrating Conveyors in the Chemical Industry

### Some Recent Developments

ALL manufacturing processes are constructive and productive, or auxiliary and nugatory. Handling methods come within the latter category. Although unproductive they are indispensable, and should, therefore, be accomplished with the highest measure of efficiency. The modern chemical works is incomplete without its conveyor system, selected with due regard to the particular requirements of each branch of the industry. Conveyors of almost all known forms of construction are more or less suitable for the mechanical handling of such materials as minerals, coal, coke, stone, clinker, seeds, cereals and nuts, but fine materials such as cement, plaster of paris, sand, and the powders produced by grinding or crushing the first named substances, as well as sugar, salt and spices, are all more or less difficult to handle.

The vibrating conveyor embodies the latest developments in mechanical conveying, and no discussion of material

brief review of some of these installations serves to show their ability to handle a wide variety of materials, coarse and fine, wet or dry.

Fig. 1 shows a 60 ft. tubular conveyor, 20 in. diameter, suspended beneath the discharge from Dwight and Lloyd sinter machines in one of the world's largest steel plants. Here, abrasive sinter below  $1\frac{1}{2}$  in. at  $800^{\circ}$  F. is discharged into the conveyor at four separate hoppers, spaced along the tub. In addition to the roasted sinter being



Fig. 1.—Tubular Conveyor in use in a large Steel Plant.

handling equipment would be complete without a consideration of the high frequency all electric type of vibrator conveyor.

The conveyor manufactured by Thomas Locker and Co., Ltd., of Warrington, fulfils a number of interesting requirements. The conveyor is a self-contained unit which may be operated on the level, downhill, or as steep as  $15^{\circ}$  uphill. The vibrator units which oscillate the conveyor take their energy from any standard A.C. current. With each conveyor, regardless of its shape—tubular, open launder or

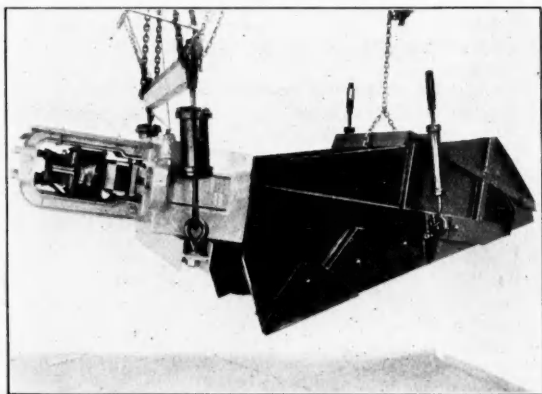


Fig. 2.—Single Motor Heavy Duty, Pan Feeder for Heavy Tonnes.

rectangular, a small motor generator set is furnished which enables the operator to regulate the amplitude of vibration and thus control the speed of travel of the material. Moreover, the vibrator units, being entirely electrically operated, require no lubrication or oil. They are without striking or wearing parts that require attention and replacement. A

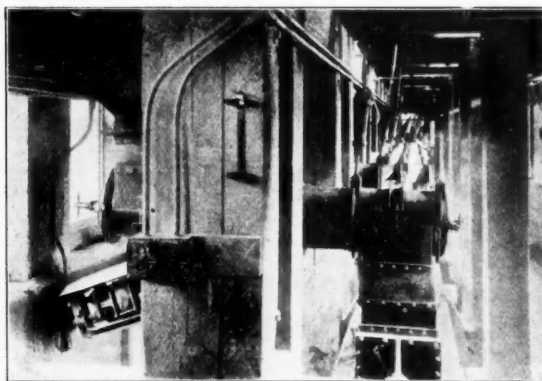


Fig. 3.—A Battery of Single Motor Tubular Feeders.

discharged into the conveyor, all dust recovered in other parts of the mill is re-fed into this dust-tight conveyor. The tonnage is 40 tons per hour, with peak loads running up to 80 tons per hour.

The single motored machine heavy duty pan feeder, shown in Fig. 2, illustrates the ability of this type of conveyor to

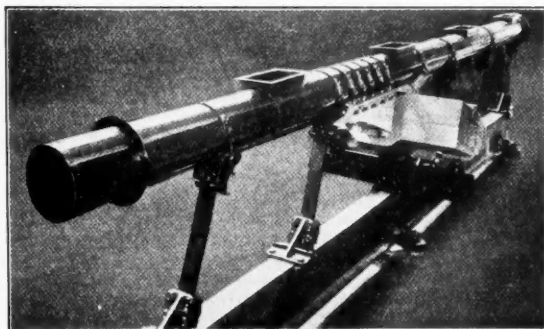


Fig. 4.—Conveyor Tube of the Cantilever Type for Delivering Coal to Boilers.

handle heavy tonnages. The entire feeder is suspended, so that no vibration is transmitted to the building supports. Eleven of these feeders are being used in the circuit of a well-known aggregate plant.

Fig. 3 is a view looking down a battery of single motor 6 ft. tubular feeders, 4 in. diameter. Each feeder is taking flue dust from bins to a mixing trough. Flexible connections at both hopper and discharge units prevent poisonous dust from escaping and endangering the lives of the workmen. The same vibrator can be used to oscillate a pan type feeder where the confining of poisonous or costly dust is not an important factor. Each feeder requires less than 1 h.p. to operate and the feeders require little or no attention after the first few days of tightening.

A 10 in. diameter tube 20 ft. long of the cantilever type as illustrated in Fig. 4 requires only one power unit. The feeder is used in a large industrial plant to deliver 15 tons per hour of coal below  $1\frac{1}{2}$  in. (moisture content up to 15 per cent.) to the boilers.



## Letters to the Editor

The Editor welcomes expression of opinion and fact from responsible persons for publication in these columns. Signed letters are, of course, preferred, but where a desire for anonymity is indicated this will invariably be respected. From time to time letters containing useful ideas and suggestions have been received, signed with a nom-de-plume and giving no information as to their origin. Correspondence cannot be published in THE CHEMICAL AGE unless its authorship is revealed to the Editor.

### Marking of Scientific Glassware

SIR,—The attention of the British Chemical Ware Manufacturers' Association, Ltd., and the British Lampblown Scientific Glassware Manufacturers' Association, Ltd., has been constantly called to breaches of the provisions of the Merchandise Marks Act, 1926, by many firms engaged in the marketing of imported scientific glassware. In particular the complaints relate to advertisements, samples and the method of marking adopted.

As regards advertisements, we wish to point out that where any imported scientific glassware of the descriptions included in the schedule to the Merchandise Marks (Imported Goods) No. 5 Order, 1929, is advertised or offered for sale as being goods of a particular brand or make or otherwise under a specific designation, whether by means of an illustration or by means of any written matter, an indication of the origin of the goods must be included in the advertisement or offer for sale. This provision affects not only press advertisements, but catalogues, price lists, leaflets or any other offers for sale.

If any of this glassware is sold or offered for sale by

sample the indication of origin prescribed in the Order must be applied to the samples.

The Order in question requires the indication of origin to be applied to each article by acid-stamping or etching, sand-blasting, engraving or burnt-on enamel.

It is believed that in many cases the Act has been contravened in the above respects quite unintentionally and for this reason it has been decided to circularise the Press and leading firms drawing attention to the matter. We desire to point out, however, that anyone not complying with the above provisions may render himself liable to proceedings under the Act.—Yours faithfully,

DOUGLAS H. BAIRD,  
Chairman,

British Chemical Ware Manufacturers' Association, Ltd.  
R. H. D. RAPKIN,

Chairman,  
British Lampblown Scientific Glassware Manufacturers' Association, Ltd.

6 Holborn Viaduct,  
London, E.C.1.

## New Dyestuffs

The Editor will be pleased to receive particulars of new dyestuffs for notice in this column, as and when such dyestuffs become commercially available.

Polyphenyl Black SG, Polyphenyl Black SB, and Polyphenyl Dark Blue SR are new productions of the Geigy Colour Co., Ltd., for dyeing cotton, artificial silk (except acetate silk), real silk, half-silk, unions and mixed fabrics consisting of cotton and artificial silk. They distinguish themselves chiefly with good fastness to acids and alkali. The shade of Polyphenyl Black SG is a greenish, full black of good fastness to acid, alkali, calendering and perspiration, with fairly good fastness to light. This colour possesses a great affinity to silk and produces upon weighted and unweighted silk full-bodied, bloomy deep black tones. The fastness properties on silk are markedly superior to those on cotton and artificial silk. Polyphenyl Black SG is also very suitable for dyeing unions and half-silk on which materials nice solid shades are obtained which will not bronze and are not impaired by the boiling process. Fastness to light on unions and half-silk is considerably superior to that of the ordinary blacks for these materials. The dischargeability of this dyestuff is also good; the shade turns purer and more bluish on steaming. Polyphenyl Black SB serves for the same purpose and behaves like the SG quality, only the shade is more on the blue side. With combinations of these two brands any desired black shade can therefore be produced. Polyphenyl Dark Blue SR is a somewhat reddish, deep navy blue for the materials already mentioned, possessing the same good properties. With this colour solid shades are obtained on mixed fabrics consisting of cotton and artificial silk. Dyeing is carried out in a soap bath with addition of 5 to 10 per cent. Glauber's salt crystals, raising the temperature quickly to boiling point and dyeing at the boil for 45 minutes to one hour. The requisite amount of colour is added gradually, in portions of 0.5 to 1 per cent.

Diphenyl Reserve Black ASW and ASWR, which are also productions of the Geigy Colour Co., Ltd., will leave acetate silk effects a pure white. The ASW brand gives a more bluish, the ASWR quality a more reddish shade. They possess the fastness standard usual for direct colours. For higher requirements as regards fastness to washing, water and sea-water, there is Diazophenyl Black ASW and ASWR which can be diazotised and developed as usual. It is best to use the following mixture: one-third beta-naphthol, two-thirds resorcin; metatoluylene diamine should be avoided because it stains acetate silk. Diphenyl Green FF is a new green direct colour for cotton and artificial silk (acetate silk

excepted). This new brand is recommended for the covering of cotton unions, because at ordinary temperature and without any addition it leaves the wool white. At temperatures of about 50° C. wool is stained only slightly and at 90° C. dyed the same depth as cotton, so that at this temperature level shades can be produced. Diphenyl Green FF is also very well dischargeable.

Another new production of the Geigy Colour Co., Ltd., Eclipse Brilliant Green 2BT, is a sulphur dyestuff which gives a very clear green shade and is somewhat bluer and brighter than Eclipse Green 3GP. It is distinguished by its good all-round fastness properties and on after-treatment with metallic salts, the fastness to washing and light is improved. This latter property enables the colour to be used for the best class of work and is, therefore, recommended for the dyeing of cotton, and all kinds of viscose artificial silks if it has not been completely removed.

## Dyestuff Licences

### Applications in June

THE following statement relating to applications for licences under the Dyestuffs (Import Regulation) Act, 1920, made during June has been furnished to the Board of Trade by the Dyestuffs Advisory Licensing Committee. The total number of applications received during the month was 357, of which 333 were from merchants or importers. To these should be added 33 cases outstanding on May 31, making a total for the month of 390. These were dealt with as follows:—Granted—368 (of which 363 were dealt with within seven days of receipt); referred to British makers of similar products—17 (of which 16 were dealt with within seven days of receipt); outstanding on June 30—five. Of the total of 390 applications received, 379, or 97 per cent., were dealt with within seven days of receipt.

### United States Iodine Imports

IMPORTS of crude iodine into the United States during the first four months of 1932 were lower than in the corresponding period a year ago, entries aggregating 94,756 lb. (approximately £64,000) and 121,493 lb. (approximately £90,000) respectively.

## New Technical Books

**ANALYTICAL CHEMISTRY.** Translated from the German text of F. P. Readwell by William T. Hall. Volume I: Qualitative Analysis. Eighth English Edition, pp. 640. Chapman and Hall, Ltd. 28s. 6d. net.

In this edition the entire text has been critically examined by Dr. W. R. Schoeller, who has offered over 300 suggestions, which have improved the usefulness of the book to a marked degree. A syllabus is included of the course of instruction in qualitative analysis as given at the Massachusetts Institute of Technology, to show how this book can be used advantageously as a laboratory manual.

\* \* \*

**THE SCIENTIFIC PRINCIPLES OF PETROLEUM TECHNOLOGY.** By Dr. Leo Gurwitsch and Harold Moore. New Edition, pp. 572. Chapman and Hall, Ltd. 30s. net.

The English translation of Professor Gurwitsch's book appeared in 1926, and the present volume has been published subsequent to the death of Professor Gurwitsch. Its preparation has been undertaken jointly by Mr. Harold Moore and Mr. C. I. Kelly. A considerable amplification of the chemistry and physics sections has been attempted and special attention has been paid to the section dealing with sulphur, acid treatment, detonation and motor fuels. Additions of an entirely new character will be found in the form of a treatment of the power factor of insulating oils, tube still distillation, and the hydrogenation of petroleum. The book is divided into three main sections—raw material, manufacture, and products. The discourse on chemical processes in distillation and destructive distillation is followed by the consideration of such points as duration of heating, pressure, nature of material, catalysts, pressure distillation, liquid phase and vapour phase cracking, and the Bergius process. The same exacting detail is followed in dealing with the subject of sulphuric acid refining, where the influence of the quantity of acid, strength of acid, temperature, manner of mixing, duration of operation, action of light, and impurities in the acid are all duly considered. There is a special chapter on the utilisation of waste products from the refining process, dealt with under the headings of acid waste and soda waste, and further chapters are concerned with refining by selective solubility and by adsorption.

\* \* \*

**FUEL TESTING: Laboratory Methods in Fuel Technology.** By Godfrey W. Himus. Pp. 257. London: Leonard Hill, Ltd. 15s. net.

In this book will be found full instructions of reliable methods of analysing and testing fuels, and much practical advice on the all-important question of the choice of fuels for particular purposes. By the intelligent application of the information given, the manufacturer is assured of the highest efficiency in fuel consumption, and he will be astonished at the economies it is possible to effect in this department. A special feature is made of the selection of coal for various industrial purposes, the fixing of contracts, and the writing of technical reports. This section of the book is quite unique, for in no other book will a practical exposition of these vital matters be found. Throughout, the author stresses the principle that true economy does not consist in using little material, but in using it wisely. Nowadays the measurement of temperature on the works is a matter of great importance and the author has accordingly dealt with this in sufficient detail for practical purposes. In view of the increasing practice of coal cleaning, a chapter is also devoted to this subject, including particulars of washability tests. The author is lecturer in fuel technology at the Imperial College of Science and Technology, and was formerly chief chemist to the Municipal Electricity Department, Shanghai. In the latter capacity he was responsible for all analytical work arising from the purchase of some quarter of a million tons of coal annually on a rigid sampling basis, and also for the supervision of full scale trials of coal under boilers, and for the accumulation and working up of technical records of a modern power station of about 80,000 kilowatt capacity.

**THE ANALYSIS OF FUEL, GAS, WATER AND LUBRICANTS.** By S. W. Parr. Fourth edition, pp. 371. McGraw-Hill Publishing Co., Ltd. 18s. net.

The revision of this book was made difficult by the death of the author just before the completion of his task. Among the new topics presented in Part I, an attempt has been made to give the student an idea of the research method of attack on new and difficult problems. The purpose of this is not only to foster the idea of creative thinking, but also to facilitate a better understanding of modern technical literature. The lectures, which comprise Part I, deal with power, distribution and production of coal, the development of fuel research, calorimetry, constitution and classification of coal, oxygen absorption, ignition temperature, storage of coal, combustion, carbonisation methods, processed fuel, fuel gas, etc. Remaining chapters deal with the character and treatment of boiler waters, the embrittlement of boiler plate, and lubricants. In Part II various laboratory methods are set out in detail for the sampling and proximate analysis of coal, the calorimetry of fuels, sulphur determination, ultimate analysis, flue gases, and chemical and physical tests concerning fuels and lubricants.

## Other Books Received

- ECONOMIC CONDITIONS IN POLAND, 1931.** Report by R. E. Kimens. Department of Overseas Trade. London: H.M. Stationery Office. Pp. 62. 2s.
- TIN SOLDERS.** By S. J. Nightingale. London: British Non-Ferrous Metals Research Association. Pp. 90. 5s.
- CHEMICAL ENCYCLOPAEDIA.** By C. T. Kingzett. London: Bailliere, Tindall and Cox. Pp. 1014. 40s.
- INSTITUTE OF CHEMISTRY REGISTER OF FELLOWS, ASSOCIATES AND STUDENTS, 1932.** London: Institute of Chemistry. Pp. 306.
- OSIRIS AND THE ATOM.** By J. G. Crowther. London: George Routledge & Sons, Ltd. Pp. 221. 5s.
- THE ELDER PLINY'S CHAPTERS ON CHEMICAL SUBJECTS. Part II.** Edited by Kenneth C. Bailey. London: Edward Arnold and Co. Pp. 290. 15s.
- ECONOMIC CONDITIONS IN ESTONIA.** March 31, 1932. Report by A. J. Hill. Department of Overseas Trade. London: H.M. Stationery Office. Pp. 24. 9d.
- ECONOMIC CONDITIONS IN NORWAY, MARCH, 1932.** Report by C. L. Paus. Department of Overseas Trade. London: H.M. Stationery Office. Pp. 76. 2s. 3d.
- F.B.I. REGISTER OF BRITISH MANUFACTURERS, 1932-33.** London: Federation of British Industries. Pp. 524.
- K.P. FERTILISER HANDBOOK FOR NEW ZEALAND.** The Maintenance of Soil Fertility. Dunedin, New Zealand: Kemphorne Prosser and Co.'s New Zealand Drug Co., Ltd. Pp. 144. Free to applicants.
- REPORTS ON THE PROGRESS OF NAPHTHOLOGY, 1930-1931.** London: The Institution of Petroleum Technologists. Pp. 444. 10s. 6d.
- DIRECTORY OF PAPER MAKERS OF GREAT BRITAIN AND IRELAND.** London: Marchant Singer and Co. Pp. 260. 5s. 6d.
- ECONOMIC CONDITIONS IN ANGOLA (PORTUGUESE WEST AFRICA).** Report by G. H. Bullock. Department of Overseas Trade. Pp. 56. 1s. 6d.
- SOAP MAKERS' DIRECTORY, 1932.** London: Simpkin Marshall, Ltd. Pp. 84. 2s. 6d.
- AN INTRODUCTION TO THE SCIENTIFIC STUDY OF THE SOIL.** By Norman M. Comber. London: Edward Arnold and Co. Pp. 208. 7s. 6d.
- FIXED NITROGEN.** Edited by Harry A. Curtis. New York: Chemical Catalog Co. Inc. Pp. 514. \$12.00.
- AN INTRODUCTION TO ORGANIC CHEMISTRY.** By Ira D. Garard. London: Chapman and Hall, Ltd. Pp. 296. 16s. 6d.
- MICROCHEMICAL LABORATORY MANUAL.** By Friedrich Emich. London: Chapman & Hall, Ltd. Pp. 180. 18s. 6d.
- AN INTRODUCTION TO ORGANIC CHEMISTRY.** By Alexander, Lowy and Benjamin Harrow. London: Chapman and Hall, Ltd. Pp. 412. 18s. 6d.
- LAISEGANG RINGS AND OTHER PERIODIC STRUCTURES.** By Ernest S. Hedges. London: Chapman and Hall. Pp. 122. 10s. 6d.
- PROTECTIVE FILMS ON METALS.** By Ernest S. Hedges. London: Chapman and Hall, Ltd. Pp. 276. 15s.
- THE HEAT TREATMENT AND ANNEALING OF ALUMINIUM AND ITS ALLOYS.** By N. F. Budgen. London: Chapman and Hall, Ltd. Pp. 341. 25s.
- ORGANIC SYNTHESSES. Vol. XII.** London: Chapman and Hall, Ltd. Pp. 96. 10s. 6d.
- THE LAW OF PATENTS FOR CHEMISTS.** By Joseph Rossman. Washington, U.S.A.: The Inventors Publishing Co. Pp. 304. \$3.50.

## News from the Allied Industries

### Artificial Silk

THE BRITISH OUTPUT OF RAYON YARN and waste in May was 6,090,000 lb., against 6,450,000 lb. in April and 3,920,000 lb. in May, 1931. The monthly average output in 1931 was 4,550,000 lb.

### China Clay

DEBENTURE HOLDERS in Lovering China Clays, Ltd., have passed resolutions sanctioning a moratorium on interest payments for three years. Mr. Vere Herbert Smith, one of the trustees for the debenture-holders, who presided at the meeting on June 30, said that negotiations were proceeding with a view to some working arrangement with competitive firms.

### Paper

A GREASEPROOF PAPER MILL is to be established at Speke, Liverpool, which, if all difficulties regarding the water supply are overcome, will give work to about 1,000 people. A six-months' option has been granted by the City Council to enable borings to be made in order to ascertain what supply of water can be obtained from local wells. As it stands at the moment the project demands very large supplies of clean fresh water at a price considerably lower than the Corporation can supply it. Should this difficulty be successfully overcome the promoters will float the new company immediately. Those actively connected with this venture are a London firm of paper agents, who have had considerable experience in the marketing of greaseproof paper in the United Kingdom.

### Non-Ferrous Metal

ORDINARY AND PREFERENCE SHAREHOLDERS of the Broughton Copper Co., Ltd., are to meet in Manchester on July 22 to consider a capital reduction scheme, under which the company's capital would be reduced from £525,000 in 425,000 7½ per cent. £1 preference shares and 2,000,000 ordinaries of 1s. to £475,000 in 212,500 £1 preference and 262,500 £1 ordinaries, by writing £50,000 off the ordinaries. It is proposed to reduce the value of the ordinary shares to 6d. The debit balance of £75,716 on the accounts would be eliminated by utilising, in addition, reserves of £25,716. The reduced ordinary capital would be consolidated into 50,000 £1 shares. Preference shareholders will be asked to agree to the cancellation of arrears to September 13, 1932, and to the conversion of half of their holdings into ordinaries by dividing each Preference into two 10s. shares, one ordinary and the other preference, with rights as at present, except that the dividend would not be cumulative for the next three years. The resulting 425,000 10s. ordinary shares and 425,000 10s. preference shares would immediately be consolidated into 212,500 £1 shares of each class.

THE ANGLO METAL CO., LTD., has prepared a memorandum showing the history and statistics of the International Tin Restriction Scheme from March, 1931, to the present day.

### Mineral Oil

THE SHELL OIL CO. OF BRITISH COLUMBIA has decided to construct a refinery and distribution plant on an 80-acre site at Vancouver. The plant, which will have approximately 1,800 feet of frontage on the south shore of Burrard Inlet, is to be provided with a 400-foot dock 40 ft. wide. It will refine between 2,500 and 3,000 barrels of crude oil daily, but eventually it is likely to be equipped for the handling of 10,000 barrels per day.

LARGE INCREASES in oil and coal output in Soviet Russia in the first half of the present year are announced by the official Tass Agency. 11,250,000 tons of oil were produced, exceeding the output in the same period last year by 7 per cent., and 10,500,000 tons of oil were refined, an increase of over 15 per cent. The coal output was 33,000,000 tons, a gain of 23 per cent.

ACCORDING TO INFORMATION FROM PARIS, Roumania will restrict her oil production only if Russia will agree to do the same. This, it is stated, is the proposal the Roumanian delegation is understood to have made at the International Oil Conference in Paris. It is believed that Russia will enter into the conference shortly.

### Iron and Steel

THE BRITISH IRON AND STEEL DELEGATION to Canada, headed by Sir William Larke, since it arrived in Montreal, has held informal meetings and discussions with representatives of Canadian industries. It is understood that the delegation has concrete proposals about tariff adjustments ready to submit, but is prepared to discuss and amend them, and is, above all things, anxious to reach by friendly agreement a co-operative understanding with the Canadian iron and steel industry.

THE TEMPORARY DUTIES of 33½ per cent. on iron and steel products, which would have expired on July 25, are to be continued for a further period of three months. This is the principal feature of a new Order made by the Treasury giving effect to recommendations made by the Import Duties Advisory Committee, which came into operation as from midnight on Thursday, July 7.

### Rubber

THE ANGLO-DUTCH PLANTATIONS OF JAVA reports a loss for 1931 of £142,779, which is reduced to £42,779 by the transference of £100,000 from general reserve. The credit balance carried forward is reduced to £131,251. For the second year in succession there is to be no dividend. In respect of 1930 the company made a net profit of £53,942, while in 1929 the net earnings of the Anglo-Dutch were £378,722, the shareholders receiving a dividend of 10 per cent. Reference is made in the annual report to the decision last year, in view of the vital necessity of conserving the cash resources of the company, not to make further advances to the Sumatra Anglo-Dutch Estates after November 1 last, the date up to which the Anglo-Dutch Plantation of Java guaranteed the interest on the Sumatra Company's Debenture stock. This entailed the reconstruction of the Sumatra Company and the loss of 373,570, the Anglo-Dutch Company's interests therein, which loss has been charged to capital reserve.

## The Future of Cosach

### Latest Rumours

THE CHILEAN JUNTA announced on Saturday, July 2, that the outcome of the negotiations the Minister of Finance had been conducting in regard to the future of Cosach would be the liquidation of the concern in such a way that the Chilean Treasury would not undergo any loss. Earlier in the day it was announced, however, that the Minister of Finance favoured a continuance of the company as at present, the Government reserving its right to wind it up at 30 days' notice. Meanwhile, the Cosach directorate had sent to its chairman a telegram calling his attention to certain points to be observed in arriving at a possible arrangement. The telegram pointed out that the company's debts and their services must be reduced to a point at which it would be possible to compete with independent producers and at the same time provide the Chilean Treasury with the requisite revenue. This, the directors considered, would not appear to be a difficult matter provided the cost of production were maintained at about 14 dollars per ton, the market price being 32 dollars. The telegram emphasises that the creditors of Cosach must not consider themselves outside the present universal industrial crisis, which affected all lenders.

According to information received from New York on July 5, a renewal of Cosach credits is reported to have been finally negotiated, subject to the approval of the board in Chile. An official announcement will be made after this approval has been obtained.

### United States Adipic Acid Imports

IMPORTS of adipic acid into the United States during the first four months of 1932 totalled 4,435 lb., all of which came from Germany. This is considerably larger than the incoming shipments for the entire calendar year 1931, the first year for which data were available, when 3,180 lb. were received.



## Weekly Prices of British Chemical Products

### Review of Current Market Conditions

The following notes on the chemical market conditions in Great Britain are based on direct information supplied by the British manufacturers concerned, and unless otherwise qualified the figures quoted apply to fair quantities, net and naked at makers' works. Where no locality is indicated, the prices are general for the United Kingdom. Particulars of the London chemical market are specially supplied to THE CHEMICAL AGE by R. W. Greff and Co., Ltd., and Chas. Page and Co., Ltd., and those of the Scottish chemical market by Chas. Tennant and Co., Ltd.

THERE has been very little change in the London chemical market, with prices steady and with a much better demand in all directions. Prices for coal tar products remain firm and the market conditions are unchanged from last week. Apart from a few minor alterations in prices during the past week, the Manchester chemical market has maintained a reasonably steady front since the last report. The bulk of the current business, however, is for prompt or early delivery dates and sellers this week have experienced only a very moderate demand for supplies covering any distance ahead. Deliveries are being adversely influenced to some extent by the holidays which are now going on in Lancashire, but otherwise the position in this respect is much the same as before. Buying has been better in Scotland during the past week.

#### General Chemicals

ACETONE.—LONDON: £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £37 5s. to £39 5s.; pure 80% £38 5s. to £40 5s.; tech. 40%, £19 15s. to £21 15s.; tech. 60%, £28 10s. to £30 10s. SCOTLAND: Glacial 98/100%, £48 to £50; pure 80%, £38 5s.; tech. 80%, £37 5s. d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—SCOTLAND: Granulated commercial, £26 10s. per ton; B.P. crystals, £35 10s.; B.P. powder, £36 10s. in 1-cwt. bags d/d free Great Britain in one-ton lots upwards.

ACID, CHROMIC.—11d. per lb., less 2½% d/d U.K.

ACID, CITRIC.—1s. 0½d. per lb. LONDON: 1s. 1½d., less 5%. MANCHESTER: 1s. 0½d.

ACID, CRESYLIC.—97/99%, 1s. 6d. to 1s. 8d. per gal.; 99/100%, 1s. 9d. to 2s.

ACID FORMIC.—LONDON: £50 per ton. \*£52.

ACID, HYDROCHLORIC.—Spot, 3s. 9d. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £20 to £25 per ton makers' works, according to district and quality. SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: £45 10s. per ton in casks, £48 10s. to £52 10s. in kegs. SCOTLAND: 98/100%, £49 to £52 ex store. MANCHESTER: £48, ex store.

ACID, SULPHURIC.—Average prices f.o.r. British makers' works, with slight variations owing to local considerations: 140° Tw. crude acid, £3 per ton; 168° Tw. arsenical £5 10s.; 168° Tw. non-arsenical, £6 15s. SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—1s. 0½d. per lb. SCOTLAND: B.P. crystals, 1s. 1d. to 1s. 1½d., less 5% carriage paid. MANCHESTER: 1s. 0½d. to 1s. 0½d.

ALUM.—SCOTLAND: Lump potash, £9 per ton ex store.

ALUMINA SULPHATE.—LONDON: £8 5s. to £9 10s. per ton. \*£7 10s. SCOTLAND: £8 to £8 10s. ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb. d/d, according to quantity.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £36 per ton; powdered, £38, in 5-cwt. casks d/d U.K. stations or f.o.b. U.K. ports.

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £19 to £20. (See also Sal ammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton, carriage paid according to quantity. (See also Sal ammoniac.)

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

ANTIMONY OXIDE.—SCOTLAND: Spot, £22 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 4d. to 1s. 6d. per lb. according to quality.

ARSENIC.—LONDON: £24 10s. c.i.f. main U.K. ports for imported material; Cornish nominal, £26 10s. f.o.r. mines. SCOTLAND: White powdered £27 ex wharf; spot, £27 10s. ex store. MANCHESTER: White powdered Cornish, £26 at mines.

ARSENIC SULPHIDE.—Yellow 1s. 6d. to 1s. 8d. per lb.

BARIUM CHLORIDE.—£11 to £11 10s. per ton.

BISULPHIDE OF LIME.—£7 10s. per ton f.o.r. London, packages free.

BLEACHING POWDER.—Spot 35/37% £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 15s. in 5/6 cwt. casks.

BORAX, COMMERCIAL.—Granulated £15 10s. per ton, powder £17, packed in 1-cwt. bags, carriage paid any station Great Britain. Prices are for 1-ton lots and upwards.

CADMIUM SULPHIDE.—3s. 6d. to 3s. 9d. per lb.

CALCIUM CHLORIDE.—Solid 70/75% spot £5 5s. to £5 15s. per ton d/d station in drums.

CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.

CARBON BLACK.—5d. to 5½d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£45 to £55 per ton, drums extra.

CHROMIUM OXIDE.—10d. to 10½d. per lb. according to quantity d/d U.K. Green 1s. 2d. per lb.

CHROMETAN.—Crystals 3½d. per lb. Liquor £19 10s. per ton d/d.

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r., or ex works.

CREAM OF TARTAR.—LONDON: £5 to £5 3s. 6d. per cwt.

FORMALDEHYDE.—LONDON: £27 to £27 10s. per ton. \*£30. SCOTLAND: 40%, £28 10s. ex store.

HYDROGEN PEROXIDE.—LONDON: \*100 vols. 10d. per lb.

LAMPBLACK.—£46 to £50 per ton.

LEAD, ACETATE.—LONDON: White, £39 to £41 per ton. Brown £1 per ton less. SCOTLAND: White Crystals £40 to £41 c.i.f. U.K. ports. Brown £1 per ton less. MANCHESTER: White, £35; Brown, £33 10s.

LEAD NITRATE.—£28 per ton. MANCHESTER: £27 10s.

LEAD, RED.—SCOTLAND: £28 10s. per ton d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £40 per ton carriage paid.

LITHOPONE.—30%, £20 to £22 per ton.

MAGNESITE.—SCOTLAND: Ground Calcined £9 per ton ex store.

METHYLATED SPIRIT.—61 O.P. Industrial 1s. 8d. to 2s. 3d. gal. Pyridinised Industrial, 1s. 10d. to 2s. 5d. Mineralised, 2s. 9d. to 3s. 3d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NICKEL AMMONIUM SULPHATE.—£38 per ton d/d.

NICKEL SULPHATE.—£38 per ton d/d.

POTASH, CAUSTIC.—£30 to £33 per ton. LONDON: £42. MANCHESTER: £40 to £41.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5½d. LONDON: 5d. per lb. with usual discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports with allowance for contracts.

MANCHESTER: 5d.

POTASSIUM CARBONATE.—SCOTLAND: 96/98% spot £28 per ton ex store. LONDON: £31 10s. to £32. MANCHESTER: £32.

POTASSIUM CHLORATE.—3½d. per lb. export London in 1-cwt. kegs. LONDON: £37 to £40 per ton. SCOTLAND: 99½/100% powder, £34. MANCHESTER: £36.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

POTASSIUM NITRATE.—SCOTLAND: Refined Granulated £28 per ton c.i.f. U.K. ports. Spot £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 8½d. to 9d. per lb. SCOTLAND: B.P. crystals, 8½d. MANCHESTER: Commercial, 8½d.; B.P., 8½d.

POTASSIUM PRUSSIAN.—LONDON: 8½d. to 9d. per lb. SCOTLAND: Yellow spot material, 8½d. ex store. MANCHESTER: Yellow, 8½d.

SALAMMONIAC.—First lump spot, £42 17s. 6d. per ton d/d in barrels.

SODA ASH.—58% spot, £6 per ton f.o.r. in bags, special terms for contracts.

SODA, CAUSTIC.—Solid 76/77° spot £14 10s. per ton d/d station. SCOTLAND: Powdered 98/99% £17 10s. in drums, £18 15s. in casks. Solid 76/77% £14 10s. in drums. 70/72% £14 12s. 6d. carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £12 15s. to £14 contracts.

SODA CRYSTALS.—Spot £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£21 to £22 per ton.

SODIUM BICARBONATE.—Refined spot £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 10s. ex quay or station. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous 5d. per lb.

LONDON: 4d. per lb. with discounts for quantities. SCOTLAND: 4d. delivered buyer's premises with concession for contracts. MANCHESTER: 4d. less 1 to 3½% contracts, 4d. spot lots.

SODIUM BISULPHITE POWDER.—60/62%, £16 10s. per ton d/d 1-cwt. iron drums for home trade.

SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.

\* Prices quoted by other manufacturers.

SODIUM CHLORATE.—2½d. per lb. LONDON: £29 per ton. \*£32 10s. MANCHESTER: £29.

SODIUM CHROMATE.—3½d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals £15 ex station 4-ton lots. MANCHESTER: Commercial, £9 5s.; photographic, £15.

SODIUM NITRITE.—Spot £19 to £22 per ton d/d station in drums.

SODIUM PERBORATE.—LONDON: 10d. per lb.

SODIUM PHOSPHATE.—£13 to £15 per ton.

SODIUM PRUSSATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5½d. ex store. MANCHESTER: 5d. to 6d.

SODIUM SILICATE.—140° Tw. Spot £8 5s. per ton d/d station returnable drums.

SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d. SCOTLAND: English material £3 15s.

SODIUM SULPHATE (SALT CAKE).—Unground Spot £3 15s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 2s. 6d.

SODIUM SULPHIDE.—Solid 60/62% Spot £10 15s. per ton d/d in drums. Crystals Spot £7 15s. per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d. d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8.

SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot £9 10s. d/d station in bags.

SULPHATE OF COPPER.—MANCHESTER: £16 per ton f.o.b.

SULPHUR.—£12 5s. per ton. SCOTLAND: Flowers, £12 10s.; roll, £12; rock, £9. Ground American, £12 ex store.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.

SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.

VERMILION.—Pale or deep, 5s. 2d. to 5s. 5d. per lb.

ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.

ZINC SULPHATE.—LONDON and SCOTLAND: £12 per ton.

ZINC SULPHIDE.—1s. to 1s. 2d. per lb.

### Pharmaceutical and Fine Chemicals

The following changes in the prices of pharmaceutical and fine chemicals are announced:—

PHENOLPHTHALEIN.—4s. to 4s. 6d. per lb.

POTASS. BITARTRATE, 99/100% (cream of tartar).—94s. per cwt.

### Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:—

ACID, BENZOIC, B.P. (ex Toluol).—1s. 9½d. per lb.

ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.

ACID H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.

ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100% d/d buyer's works.

ACID, SULPHANILIC.—Spot, 8d. per lb. 100% d/d buyer's works.

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.

BENZIDINE BASE.—Spot, 2s. 5d. per lb. 100% d/d buyer's works.

o-CRESOL 30/31° C.—£2 6s. 5d. per cwt., in 1-ton lots.

m-CRESOL 98/100%.—2s. 9d. per lb., in ton lots.

p-CRESOL.—34.5° C.—1s. 9d. per lb., in ton lots.

DICHLORANILINE.—2s. 2d. per lb.

DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.

DINITROBENZENE.—8½d. per lb.

DINITROTOLUENE.—48/50° C., 8½d. per lb.; 66/68° C., 9d. per lb.

DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.

a-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.

B-NAPHTHOL.—Spot, £75 per ton in 1-ton lots, d/d buyer's works.

a-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.

B-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.

o-NITRANILINE.—5s. 10d. per lb.

m-NITRANILINE.—Spot, 2s. 7d. per lb. d/d buyer's works.

p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.

NITROBENZENE.—Spot, 6½d. per lb.; 5-cwt. lots, drums extra.

NITRONAPHTHALENE.—9d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.

o-TOLUIDINE.—Spot, 9½d. per lb., drums extra, d/d buyer's works.

p-TOLUIDINE.—Spot, 1s. 9d. per lb., d/d buyer's works.

m-XYLIDINE ACETATE.—3s. 6d. per lb., 100%.

### Coal Tar Products

ACID, CARBOLIC (CRYSTALS).—5½d. to 6½d. per lb. Crude, 60's 1s. 5½d. to 1s. 6½d. per gal. SCOTLAND: Sixties, 1s. 7d. to 1s. 8d.

ACID, CRESYLIC.—99/100, 1s. 7d. per gal.; B.P., 2s. to 2s. 2d.; Refined, 1s. 9d. to 1s. 11d.; Pale, 98%, 1s. 6d. to 1s. 7d.; Dark, 1s. 4d. to 1s. 4½d. LONDON: 98/100%, 1s. 6d. Dark 95/97%, 1s. 4d. SCOTLAND: Pale 99/100%, 1s. 3d. to 1s. 4d.; 97/99%, 1s. to 1s. 1d.; dark 97/99%, 11d. to 1s.; high boiling acid, 2s. 6d. to 3s.

BENZOL.—At works, crude 7d. to 7½d. per gal. Standard motor, 1s. 2d. to 1s. 3d.; 90%, 1s. 3d. to 1s. 4d. Pure, 1s. 6d. to 1s. 7d. LONDON: Motor, 1s. 5½d. SCOTLAND: Motor, 1s. 3½d. to 1s. 4½d.; 90%, 1s. 9½d. to 1s. 10½d.

CREOSOTE.—Standard for export, 4½d. to 5d. nett per gal. f.o.b. for Home, 3½d. d/d. LONDON: 3d. to 3½d. f.o.r. North; 4d. to 4½d. LONDON. MANCHESTER: 3½d. to 4½d. SCOTLAND: Specification oils, 3½d. to 4½d.; washed oil, 4d. to 4½d.; light, 3½d. to 4½d.; heavy, 4½d. to 5d.

NAPHTHA.—Solvent, 90/100, 1s. 4d. to 1s. 5d. per gal.; 95/100, 1s. 4½d.; 90/100, 1s. 1d. to 1s. 2d. LONDON: Solvent, 1s. 1½d. to 1s. 2d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/100, 1s. 3d. to 1s. 3½d.; 90/100, 1s. 1d. to 1s. 2d.

NAPHTHALENE.—Purified crystals, £9 10s. per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 65s. to 70s.

PYRIDINE.—90/140, 3s. 9d. per gal.; 90/160, 4s. to 4s. 6d.; 90/180, 2s. to 2s. 6d. SCOTLAND: 90/160%, 4s. to 5s.; 90/220%, 3s. to 4s.

REFINED COAL TAR.—SCOTLAND: 4½d. to 5d. per gal.

TOLUOL.—90%, 2s. 2d. per gal.; Pure, 2s. 6d.

XYLOL.—1s. 9d. per gal.; Pure, 1s. 11d.

### Wood Distillation Products

ACETATE OF LIME.—Brown, £8 per ton. Grey, £12. Liquor, 4d. to 5d. per gal. MANCHESTER: Brown, £8; grey, £11 10s.

ACETIC ACID, TECHNICAL, 40%.—£16 15s. to £18 per ton.

ACETONE.—£63 to £65 per ton.

AMYL ACETATE, TECHNICAL.—95s. to 110s. per cwt.

CHARCOAL.—£7 10s. to £12 per ton.

IRON LIQUOR.—24°/30° Tw., 10d. to 1s. 2d. per gal.

WOOD CREOSOTE.—1s. to 2s. 6d. per gal., unrefined.

WOOD NAPHTHA, MISCIBLE.—3s. to 4s. per gal. Solvent, 3s. 9d. to 4s. 9d. per gal.

WOOD TAR.—£2 to £6 per ton.

BROWN SUGAR OF LEAD.—£32 per ton.

### Latest Oil Prices

LONDON, July 6.—LINSEED OIL was firm. Spot, small quantities, £16; July, £12 17s. 6d.; Sept.-Dec. £13 7s. 6d.; Jan.-April, £14 5s. per ton, naked. RAPE OIL was steady. Crude, extracted, £28; technical refined, £30 per ton, naked, ex wharf. COTTON OIL was firm. Egyptian crude, £20 10s. Refined common edible, £24; and deodorised, £26, naked, ex mill. TURPENTINE was slow. American, spot, 58s. 9d. per cwt.

HULL.—LINSEED OIL.—Spot, £13 2s. 6d.; July, £12 15s.; Aug., £12 17s. 6d.; Sept.-Dec., £13 2s. 6d.; and Jan.-April, £14 per ton. COTTON OIL.—Egyptian crude, spot, £20 10s.; edible refined, spot, £22 15s.; technical, spot, £22 15s.; and deodorised, £24 per ton, naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £22 per ton, naked. GROUNDNUT OIL.—Crushed-extracted, spot, £31 10s.; deodorised, £35 10s. per ton. RAPE OIL.—Crushed-extracted, £27; refined £28 10s. per ton. SOYA OIL.—Crushed-extracted, spot, £20; deodorised, £23 per ton. COD OIL, 16s. per cwt. CASTOR OIL.—Pharmacy, spot, 40s. 6d.; first, 35s. 6d.; second, 30s. 6d. per cwt. TURPENTINE.—American, spot, 60s. per cwt.

### Nitrogen Fertilisers

SULPHATE OF AMMONIA.—The export market continues quiet and the price remains unchanged at £4 2s. 6d. to £4 5s. od. per ton, f.o.b., U.K. port in single bags. Only small buying has been reported. The home price of 5 guineas per ton delivered to farmers' nearest stations in 6-ton lots, is being offered for delivery up to June, 1933. A good many merchants have covered their requirements at this figure.

NITRATE OF SODA.—Prices remain unchanged at £9 per ton for imported and £8 16s. od. per ton for British, delivered in 6-ton lots.

NITRO-CHALK.—The price remains unchanged at £7 5s. od. per ton, delivered in 6-ton lots. Purchases of this product are still being made.

### United States Carbon Black Exports

CARBON black was the sixth largest item of United States chemical products exported during 1931. Besides a domestic consumption of 161,712,000 lb., exports of the pigment reached a record quantity of 96,714,116 lb., or a gain of 14.8 per cent. in quantity over 1930 shipments. The increase is attributed to greater utilisation of the pigment by the rubber industry and to low prices. Nearly all countries purchased greater quantities of carbon black in 1931. The United Kingdom, as usual, was the largest purchaser, followed by France, Germany, Canada, and Japan. Material decreases occurred in exports to Canada, Australia, and the Netherlands. For the purpose of increasing sales of carbon black in foreign markets the Carbon Black Export Association (Inc.) was organised in December, 1929, under the Webb-Pomeroy Act. This export corporation, composed of more than 92 per cent. of American manufacturers of the commodity, has promoted sales and extended the use of the pigment.

\* Prices quoted by other manufacturers.

## Acetyldihydrocodeinone

### New Orders for Control of Trade in Narcotics

IN accordance with a recommendation of the Health Committee of the League of Nations an Order in Council has been issued under Section 8 (2) of the Dangerous Drugs Act, 1920, extending Part III of that Act, which provides for the control of morphine, heroin and cocaine, to acetyldihydrocodeinone, its salts and any preparation, admixture, extract or other substance containing any proportion of acetyldihydrocodeinone. The effect of the Order is that this drug (the trade name for which is acedicone), its salts, preparations, etc., may not be imported into or exported from the United Kingdom and Northern Ireland without a licence issued by the Secretary of State under the Dangerous Drugs Act, and, as regards internal control, the Dangerous Drugs (Consolidation) Regulations, 1928, will apply. Acedicone is not manufactured in this country.

The "Recueil des Lois Fédérales" of June 15 contains a Decree, dated June 10, effective as from June 20, which extends the control of the trade in narcotics in Switzerland to cover acedicone (acetyldihydrocodeinone or acetylodemetihydrothebaine) and its salts as well as all preparations containing acedicone or its salts; codeine (methylmorphine) and dionine (ethylmorphine) and their salts. These products, therefore, now require a licence in order to be imported into or exported from Switzerland.

## Ruhr Synthetic Nitrogen Plants

### Production in 1931

THE nitrogen plant at the Sham rock pit of the Bergwerks Gesellschaft Hibernia, at Herne, Westphalia, reports sales of 17,500 metric tons nitrogen in 1931. This plant is one of the two Mont-Cenis plants originally built by the Gasverarbeitungs-Gesellschaft (Gaveg), the other at Södingen in Westphalia having been acquired by the German dye trust in 1930. Hibernia is owned by Ver. Elektricitaets und Bergwerks A.G. (Veba) of Berlin, a Prussian State property. The Shamrock plant has been producing synthetic sodium nitrate since December, 1931; this permits the enterprise to share with the I. G. on the current French 150,000 ton order. Shamrock also makes ammonium-sulphate-nitrate, and of course nitric acid and ammonia water. It supplies part of the latter to the I. G. works for manufacture of ammonium nitrate chalk. A twin synthetic nitrogen plant is that of Bergwerks A.G. Recklinghausen located at its Scholven pit. This mining company is also owned by the above-mentioned "Veba." It produced 20,200 tons nitrogen in 1931. Production of these respective plants in 1931 is said to have been but 35 per cent. of the Nitrogen Syndicate quota allotted them. The synthetic nitrogen plants are but side-lines of Hibernia and Recklinghausen production. Each of these concerns produced over 4,000,000 tons of coal in 1931 and both operate by-product coke ovens.

## Inventions in the Chemical Industry

### Specifications Accepted and Applications for Patents

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

#### Specifications Accepted with Date of Application

PROCESS FOR THE MANUFACTURE OF HORMONE-LIKE SUBSTANCES. Schering-Kahlbaum A.-G. Jan. 17, 1930. 375,363.  
PRODUCTION OF FORMALDEHYDE. Gutehoffnungshütte Oberhausen A.-G. Jan. 20, 1930. 375,314.  
CHLORINATION OF IRON SULPHIDE CONTAINING MATERIALS. R. F. Bacon. Feb. 25, 1930. 375,370.  
MANUFACTURE AND PRODUCTION OF 1,2-BENZANTHRAQUINONES. J. Y. Johnson (I. G. Farbenindustrie). Mar. 10, 1931. 375,305.  
PRODUCTION OF VIOLET AND BLUE DYEINGS ON THE FIBRE. W. W. Groves (I. G. Farbenindustrie). Mar. 17, 1931. 375,347.  
PRODUCTION OF VIOLET DYEINGS ON THE FIBRE. W. W. Groves (I. G. Farbenindustrie). Mar. 17, 1931. 375,348.  
MANUFACTURE AND PRODUCTION OF VARNISHES, AND COATINGS THEREFROM. J. Y. Johnson (I. G. Farbenindustrie). Mar. 19, 1931. 375,320.  
MANUFACTURE OF AZO-DYESTUFFS ON CELLULOSE ESTERS. W. W. Groves (I. G. Farbenindustrie). Mar. 19, 1931. 375,321.  
PROCESS FOR PURIFYING OILS AND FATS. Metallges A.-G. Apr. 4, 1930. 375,381.  
OIL-PURIFYING PLANT. J. A. Pickard and W. Mitchell. Mar. 23, 1931. 375,383.  
MANUFACTURE OF TRIBROMOETHYLALCOHOL. A. Carpmal (I. G. Farbenindustrie). Mar. 24, 1931. 375,358.  
TREATMENT OF OXIDIZABLE ORGANIC COMPOUNDS. Imperial Chemical Industries, Ltd., H. M. Bunbury, J. S. H. Davies, and W. J. S. Naughton. Mar. 24, 1931. 375,360.  
PROCESS FOR COATING METALS, SUCH AS IRON AND STEEL, WITH LEAD. J. W. Pritchard and Imperial Chemical Industries, Ltd. Mar. 24, 1931. 375,361.  
PROCESS FOR THE MANUFACTURE OF ARTIFICIAL FIBRES OR FILMS FROM CELLULOSE ESTERS. A. Carpmal (I. G. Farbenindustrie). Mar. 25, 1931. 375,393.  
PROCESS FOR THE MANUFACTURE OF TERPENES. Schering-Kahlbaum A.-G. Apr. 15, 1930. 375,395.  
PREPARATION OF ARTIFICIAL RESIN COMPRESSION MIXTURES. A. Nowack A.-G. and Dr. R. Hessen. Mar. 27, 1930. 375,396.  
PURIFICATION OF CELLULOSE BENZYL ETHER, AND PRODUCTS OBTAINED THEREBY. Imperial Chemical Industries, Ltd., and A. S. Levesley. Mar. 25, 1931. 375,399.  
PROCESS FOR THE MANUFACTURE OF ORGANIC INTERMEDIATES USEFUL IN THE MANUFACTURE OF DYESTUFFS. Imperial Chemical Industries, Ltd., S. Coffey, and J. E. Schofield. Mar. 27, 1931. 375,414.  
ANTHRAQUINONE DERIVATIVES. E. I. Du Pont de Nemours and Co. Apr. 20, 1930. 375,437.  
EXTRACTION AND REFINEMENT OF ALUMINA. Vereinigte Aluminium-Werke A.-G., and Dr. H. Ginsberg. Apr. 21, 1931. 375,476.  
PROCESS AND APPARATUS FOR THE CONVERSION OF LIQUEFIED GASES INTO GAS AT ATMOSPHERIC TEMPERATURE AND AT ANY DESIRED

PRESSURE. K. S. Murray and British Oxygen Co., Ltd. Apr. 23, 1931. 375,479.  
PROCESS FOR THE MANUFACTURE OF ALLO-PARA-OXOCAMPHOR. K. Tamura, G. Kihara, Y. Asahina, and M. Ishidate. Aug. 7, 1930. 375,510.  
TREATMENT OF ALIPHATIC ACIDS. British Celanese, Ltd. July 11, 1930. 375,549.  
MANUFACTURE OF CONDENSATION PRODUCTS OF UREA, THIOUREA, AND FORMALDEHYDE. Pollopos, Ltd. Sept. 1, 1930. 375,609.  
PRODUCTION OF ORGANIC ACID AMIDES. British Celanese, Ltd. Sept. 20, 1930. 375,627.  
PRODUCTION OF ALKALI CYANIDES. E. Hene. May 22, 1931. 375,636.  
PROCESS FOR THE MANUFACTURE OF CRESOL ETHERS ALKYLATED IN THE NUCLEUS. Rheinische Kampfer-Fabrik Ges. Nov. 10, 1930. 375,678.  
AQUEOUS FIBROIN SOLUTIONS. I. G. Farbenindustrie. Feb. 2, 1931. 375,702.  
PRODUCTION OF PARA-FORMALDEHYDE. Deutsche Gold-und Silber-Scheidenstalt vorm. Doessler. Mar. 21, 1931. 375,744.

#### Complete Specifications open to Public Inspection

MANUFACTURE OF ALKALI ALCOHOLATES. Wacker Ges für Elektrochemische Industrie Ges. June 24, 1931. 11865/32.  
CATALYTIC REACTIONS, AND CATALYSTS FOR USE THEREIN. G. Siebert Ges. June 22, 1931. 16182/32.  
METHOD OF AND APPARATUS FOR DISTILLING SUBSTANCES THAT ARE LIQUID AT DISTILLATION TEMPERATURE. Metallges A.G. June 25, 1931. 17239/32.  
PROCESS FOR THE MANUFACTURE OF AMMONIAC-MAGNESIA PHOSPHATE. C. D'Asseef. June 22, 1931. 17547/32.  
PURIFICATION OF THE CHLORIDES OF EASILY OXIDISABLE METALS. Johnson, Matthey and Co., Ltd. Feb. 20, 1931. 17591/32.  
METHOD OF REMOVING THE MOISTURE FROM OILS. Siemens-Schuckertwerke A.-G. June 22, 1931. 17671/32.  
MANUFACTURE OF PARA-AMINO-DIPHENYL AND DERIVATIVES THEREOF. I. G. Farbenindustrie. June 24, 1931. 17934/32.  
MANUFACTURE OF 4-AMINO-2:5-DIALKONY-DIPHENYL AND AZO-DYESTUFFS THEREFROM. I. G. Farbenindustrie. June 24, 1931. 17935/32.  
MANUFACTURE OF BIS-ARYLOXYETHYL ETHERS AND THEIR APPLICATION IN CELLULOSE DERIVATIVE COMPOSITIONS. E. I. Du Pont de Nemours and Co. June 25, 1931. 18093/32.  
MANUFACTURE OF DYESTUFFS. I. G. Farbenindustrie. June 27, 1931. 18109/32.

#### Applications for Patents

PRODUCTION OF COLLOIDAL SOLUTIONS OF METAL IODIDES. V. Klopfer. June 20. 17453.  
TREATMENT OF CLAYS. Merrimac Chemical Co., Inc. June 23. 17786.  
PRODUCTION OF ACETIC ACID. H. A. Patterson. June 20. (United States, June 20, '31.) 17420.



- PREPARATION OF COLLOIDAL COMPOUNDS. H. A. Proctor. June 22. 17467.
- PHOTOCHEMICAL OXIDATION OF ORGANIC, ETC., COMPOUNDS. C. Rosen, C. Rutter and Vereinigte Chemische Fabriken Kreidl, Heller and Co. June 21. (Australia, July 21, '31.) 17577.
- MANUFACTURE OF PHOSPHORUS. Victor Chemical Works. June 22. (United States, July 11, '31.) 17657.
- MACHINES FOR DYEING FABRICS. Yorkshire Dyeing and Proofing Co., Ltd. June 22. 17597.
- MANUFACTURE OF ALUMINATES. Aluminium, Ltd. June 30. (United States, March 28.) 18517.
- PASTEURISING APPARATUS. Aluminium Plant and Vessel Co., Ltd., A. C. Burnett and T. E. French. June 29. 18385.
- SEPARATION OF METALS. American Smelting and Refining Co. June 29. 18414, 18415.
- PRODUCTION OF LEAD PIGMENTS. B.A.H. Trust, Ltd., and S. S. Webb-Bowen. July 1. 18630.
- MEANS OF EVACUATION OF GASES AND VAPOURS FROM OIL AND FAT DISTILLATION VESSELS. S. A. S. Bunting. July 1. 18584.
- DYESTUFFS. S. Coffey, R. W. Everatt and Imperial Chemical Industries, Ltd. June 28. 18285.
- BRINGING MUTUALLY-IMMISCIBLE LIQUIDS OF DIFFERENT SPECIFIC GRAVITY INTO INTIMATE CONTACT. C. Cooper, D. M. Henshaw, and W. C. Holmes and Co., Ltd. June 30. 18485.
- DISTILLATION OF VOLATILE LIQUIDS. C. Cooper, D. M. Henshaw, W. C. Holmes and Co., Ltd. June 30. 18486.
- PAPER AND PROCESS FOR MAKING SAME. F. B. Dehn (*International Bitumen Emulsions Corporation*). June 27. 18117.
- PREPARATION OF BERYLLIUM COMPOUNDS. Deutsche Gold-und-Silber-Scheideanstalt vorm. Roesler. June 27. (Austria, July 31, '31.) 18184.
- MANUFACTURE OF BIS-ARYLOXYETHYL ETHERS, ETC. E. I. Pont de Nemours and Co. June 27. (United States, June 25, '31.) 18093.
- MANUFACTURE OF DYES. Kodak, Ltd. (*Eastman Kodak Co.*). June 30. 18534.
- MANUFACTURE OF CYANINE DYES. Kodak, Ltd. (*Eastman Kodak Co.*). June 30. 18536.
- MANUFACTURE OF LEATHER DYES. J. Hannon, Imperial Chemical Industries, Ltd., and M. Mendoza. June 27. 18173.
- SECONDARY ARYLAMINES. S. Hartley and Imperial Chemical Industries, Ltd. June 29. 18426.
- PRODUCTION OF IMPREGNATING, ETC., AGENTS. J. Y. Johnson (*I. G. Farbenindustrie*). June 30. 18531.
- MANUFACTURE OF ANTISEPTIC AGENTS. J. Y. Johnson (*I. G. Farbenindustrie*). July 2. 18765.
- DYESTUFFS. I. G. Farbenindustrie. June 27. (Germany, June 27, '31.) 18109.
- MANUFACTURE OF BENZYL CELLULOSE. I. G. Farbenindustrie. June 29. (Germany, June 29, '31.) 18432.
- CONVERSION OF MASSES OF WAXES, ETC., INTO SMALL PIECES. I. G. Farbenindustrie. June 29. (Germany, July 1, '31.) 18433.
- MANUFACTURE OF MOISTURE-PROOF COMPOSITIONS. Imperial Chemical Industries, Ltd. June 27. 18174.
- MANUFACTURE OF LAMINATED NON-SPLINTERING GLASS. Imperial Chemical Industries, Ltd., and A. Renfrew. June 30. 18567.
- TREATMENT OF MILD STEEL. Imperial Chemical Industries, Ltd., N. P. Inglis and G. F. Lake. July 2. 18770.

## From Week to Week

AN INDEX TO VOLUME XXVI OF THE CHEMICAL AGE is published with this issue. It will be found inside the back cover, whence it can readily be detached for binding purposes.

MR. H. G. BENNETT has been appointed manager of the Hawthorne Tannery, Litherland, of Walker, Ltd.

DR. A. J. V. UNDERWOOD has been appointed honorary lecturer in the Department of Chemical Engineering at University College, London, for the session 1932-33.

SIR FREDERICK HOPKINS, president of the Royal Society, received the honorary degree of D.C.L., Durham University, at a convocation in Armstrong College, Newcastle, on June 29.

THE LIBRARY OF THE CHEMICAL SOCIETY will be closed for stock-taking from Monday, August 1, until Saturday, August 13, inclusive, and will close each evening at 5 o'clock from August 15 to September 10.

THE HYDRONYL SYNDICATE, LTD., formerly of Medway House, Horseferry Road, Westminster, S.W.1, has moved its offices to 50 Queen Anne's Gate, Westminster, S.W.1. Telephone: Victoria 6172. Telegraphic address: "Hydronyl, Parl, London."

THE PETITION FOR THE WINDING-UP of the Non-Inflammable Film Co., Ltd., which was down for hearing at the Royal Courts of Justice on Monday, July 4, has been allowed to stand over until July 18.

SIR ROBERT HADFIELD, Mr. J. Kewley and Mr. W. Macnab have joined the General Appeal Committee set up for the restoration of the Library of Witwatersrand University, which was recently badly damaged by fire. Dr. W. Cullen is on the Executive Committee.

THE RESEARCH COMMISSION of the Soviet Academy of Science, which was sent to Central Asia, is reported to have discovered deposits of mercury, antimony, and radium in the district of Southern Ferjana. The building of a chemical combine in this district is being planned. Experimental plants are already in course of construction for the production of mercury and antimony. The building of large concentration factories is to be commenced in the early part of 1933.

THE DIRECTORS of the Staveley Coal and Iron Co., Ltd., have elected Mr. Samuel Henshaw, chairman of the National Benzol Co., to fill the vacancy on the board caused by the death of Mr. L. N. Barrow. Mr. Henshaw is a director of the National Benzol Co., the New Acid Co., Staffordshire Chemical Co. (1917), and was for many years joint managing director of the Talk o' th' Hill Colliery Co. He is also a vice-chairman of the British Sulphate of Ammonia Federation and a vice-president of the National Benzol Association.

A PARTY OF ARGENTINE STUDENTS on a visit to Great Britain was recently received at Imperial Chemical House by Sir Harry McGowan, chairman of Imperial Chemical Industries, Ltd., who referred to the mutual appreciation which had always marked the company's relations with the Government and commercial community in the Argentine. Mr. A. G. Major, of the foreign department, presided at a luncheon, at which the hospitality of the company was acknowledged by Dr. C. P. Waldorp, who was in charge of the party.

MR. J. E. SAUL, F.I.C., has been appointed a director of Savory and Moore in place of Mr. A. L. Savory, deceased.

MR. T. L. GARNER has left the Avon India Rubber Co. to become development manager to the Leicester Rubber Co.

DON ENRIQUE VILLEGAS, the Chilean Ambassador in London, has been appointed to represent Chile at the meeting of producers of synthetic nitrates in Berlin.

THE IMPERIAL CHEMICAL INDUSTRIES MAGAZINE for July reports the return of Lord Melchett, who has now recovered from the illness which kept him away from duty for several weeks.

UNDER THE WAR LOAN CONVERSION SCHEME announced on June 30, Imperial Chemical Industries, Ltd., has agreed to the conversion of the whole of its 5 per cent. war loan holdings, amounting to £760,000.

HARRY TAYLOR, a chemical labourer, employed at the Deighton works of L. B. Holliday and Co., Ltd., sustained injuries to his face and head at the works on June 30. He was feeding anthraquinone into sulphuric acid when a fire occurred.

AN EXTRAORDINARY MEETING of British Tintex and Dye Products was held on June 30, when a resolution reducing the capital from £200,000 to £42,470 by writing off 4s. 6d. from each of the issued shares was defeated on a show of hands, but was carried on a poll by a large majority.

A MEETING OF THE MEMBERS of the Royal Institution was held on July 4. Sir Robert Robertson, treasurer and vice-president, being in the chair. The chairman reported that an interesting collection of Faraday letters had been received from Sir Robert Mond. Mr. Francis Cecil Chalkin and Mr. Leonard Patrick were elected members.

DR. J. V. N. DORR, president of the American Institute of Chemical Engineers, recently visited this country. Lord Leverhulme, president of the Institution of Chemical Engineers, entertained him to luncheon to meet the members of the Council. The American Institute will celebrate in December next its twenty-fifth birthday, at its meeting to be held in Washington, D.C., on December 7, 8 and 9. In this connection it is proposed to issue a special Semi-Jubilee volume of Transactions, in which prominent engineers will review the growth and development of the Institute and of the chemical engineering profession in the United States.

## Forthcoming Events

**July 12 to 15.**—Society of Chemical Industry. Fifty-first Annual Meeting. Presidential Address, "Ourselves and Kindred Societies." Professor G. T. Morgan. Presentation of Messel Medal. "Forty Years of Stereo-chemistry." Sir William Pope. University College, Nottingham.

**July 13.**—Society of Glass Technology. Special Ordinary General Meeting. Visit to the sites of Mediaeval Glass Works in Sussex and Surrey.

## Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

### Mortgages and Charges

[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an \*—followed by the date of the Summary, but such total may have been reduced.]

**BELPLASTIC, LTD.**, London, W., moulded product dealers. (M. 9/7/32.) Registered June 23, £350 debentures, part of £5,000 (not ex.), general charge. \*£2,250. April 12, 1932.

**BRITISH SOLUMIN (1931), LTD.** (late Albron, Ltd.), London, W., aluminium solder manufacturers. (M. 9/7/32.) Registered June 22, £1,000 debentures, to J. E. Saul, Black Warren, Radlett, general charge.

**VISCO ENGINEERING CO., LTD.**, Croydon. (M. 9/7/32.) Registered June 15, £9,000 charge, to Town Investments, Ltd., 47 Grosvenor Street, W.; charged on part of Waddon Factory Estate. \*— March 11, 1932.

### County Court Judgment

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

**STANSFIELD, Jno.**, 4 Lansdowne Road, Higher Crumpsall, Lancashire, oil and chemical dealer. (C.C. 9/7/32.) £21 9s. 10d. June 4.

### London Gazette, &c.

#### Companies Winding Up Voluntarily

**BRITISH BERGIUS SYNDICATE, LTD.** (C.W.U.V., 9/7/32.) By special resolution, June 30. Mr. John Wheatley Ridsdale appointed liquidator.

**COMBINED PULP AND PAPER MILLS, LTD.** (C.W.U.V., 9/7/32.) By special resolution, June 30. Mr. J. W. Vincent, 53 New Broad Street, London, E.C.2, appointed liquidator.

**IODINE PRODUCTS, LTD.** (C.W.U.V., 9/7/32.) By reason of its liabilities, June 30. Mr. Ronald Sydney Yates, 199 Piccadilly, London, appointed liquidator.

**UNITED PAPER MILLS, LTD.** (C.W.U.V., 9/7/32.) By special resolution, June 30. Mr. Harold Douglas Bell, 53 New Broad Street, London, E.C.2, appointed liquidator.

#### Companies Winding Up

**THE PARENT COAL CARBONISATION TRUST, LTD.** (C.W.U., 9/7/32.) Winding up order, June 30.

#### Bankruptcy Information

**POURBAIX, JULES FERNAND VITAL**, "Braemar" Ealing Road, Alperton, Middlesex. Research chemist. (R.O., 9/7/32.) Receiving order, June 30, creditor's petition. First meeting, July 14, 11 a.m., Bankruptcy Buildings, Carey Street, London, W.C.2. Public examination, September 20, 1932, 11 a.m., Bankruptcy Buildings, Carey Street, London, W.C.2.

## Company News

**Motor Fuel Proprietary, Ltd.**—In their report for the year ended May 31 last, the directors state that it was not possible for the Rational Carbonisation Syndicate, Ltd., to repay the amount due to the company for loans and interest on mortgage. On the other hand, they put forward a claim that large sums, over and above these loans, had been expended on behalf of the company. This was refuted by the directors, and a compromise was arrived at by making the arrangement that all assets charged under the mortgage, including the plant at Slough should be transferred to the company and that the royalty payable to the Rational Carbonisation Syndicate, Ltd., under their agreement, should be reduced from 25 per cent. to 10 per cent. The directors, the report states, are

considering the best means of raising further capital to carry on, until it is possible to obtain finance to erect commercial plants. The annual meeting will be held at 24 St. Mary Axe, London, on July 13, at 2 p.m.

## Chemical Trade Inquiries

Abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

**Norway.**—A firm in Oslo wishes to represent United Kingdom manufacturers of aeroplane glues and articles for aeroplane factories. (Ref. No. 18.)

**Holland.**—An agent established at Jotphaas wishes to obtain the representation of United Kingdom manufacturers of vegetable oils, and colours on a commission basis. (Ref. No. 17.)

**Trinidad.**—A commission agent in Port of Spain desires to undertake the representation, on a commission basis, for Trinidad only, of United Kingdom exporters of drugs and patent medicines, chemicals (sulphate of ammonia and sulphuric acid, liquid stannine, roll sulphur and carbide). (Ref. No. 3.)

**Egypt.**—The Commercial Secretary to the Residency, Egypt, reports that the Egyptian Ministry of Public Works is calling for tenders, to be presented in Cairo by August 6, 1932, for the supply of coloured cotton waste, red lead paint powder, red enamel, aniline red stain and cassia line. (Ref. F.X. 1531.)

**Brazil.**—A firm established in Rio de Janeiro wish to obtain the representation of United Kingdom manufacturers of raw materials for the glass, ceramic and paper industries. It also wishes to represent United Kingdom manufacturers of copper, brass, steel rails, etc. (Ref. No. 24.)

**Canada.**—A Toronto firm engaged in the manufacture and sale of small pumps, both centrifugal and gear type for pumping liquids, desires to obtain the representation of United Kingdom firms offering both centrifugal and gear type pumps, in order to complete their own range. The agency would be on a commission or consignment basis, and in respect of the whole Dominion. (Ref. No. 5.)

**Uruguay.**—The British Consul at Montevideo reports that the Administracion Nacional de Combustibles, Alcohol y Portland, at Montevideo, is calling for tenders, to be presented in Montevideo by October 31, 1932, for the planning and construction of a petroleum refinery, capable of treating about 450 cubic metres of crude petroleum per 24 hours. (Ref. A.X. 11394.)

### Other Inquiries

**Palatinol.**—A firm of merchants requires the names and addresses of the makers or importers of Palatinol. (Ref. No. C.A. 182.)

## Tariff Changes

**Czechoslovakia.**—In connection with recent legislation subjecting the importation of all goods, except those subject to luxury turnover tax and those to be specified by Government Ordinance, to the payment of turnover tax into Czechoslovakia, a Government Ordinance, dated May 27, effective as from June 1, lays down a list of goods, the importation of which is exempt from the payment of turnover tax. This list includes:—Sulphur (in lumps and sticks), even ground, and flowers of sulphur; phosphorus; metallic arsenic; calcined magnesia magnesium oxide not chemically pure; potassium chloride having a potassium content in excess of 54 per cent.; crude borax; beet potash; magnesium chloride; lamp black; agar-agar; butyl alcohol cleared through the Customs houses at Bratislava, Bodenbach-Tetschen, Prague and Aussig, and accompanied by a Chamber of Commerce certificate to the effect that it will be used in the manufacture of varnish; dimethylic, diethylic and dibutylic esters of phthalic acid; monomethylic, dimethylic, monomethylic and diethylic ethers of ethylene glycol; acetates of ethyleneglycolmonomethylether and of ethyleneglycolmonoethylether; chemical auxiliary materials and products not specially mentioned in the Tariff (except synthetic manganese dioxide, artificial corundum, sodium peroxide, potassium cyanide, sodium cyanide, sodium hydro-sulphite, sodium perborate, silver nitrate, artificial cryolite, trichlorethylene, formic acid, lactic acid, benzoic acid, sodium benzoate, formaldehydesulphoxylate, cocaine and alkaloids of opium (including codeine); triphenylphosphate, tricresylphosphate, cyclohexanone, and methylcyclohexanone; coal tar dyes, with the exception of sulphur black, anthraquinone dyes (other than vat anthraquinone dyes) and a list of dyes to be published in an Ordinance of the Minister of Finance.

### Casein Exports from Australia

EXPORTS of casein from Australia during the first six months (July 1 to December 31, 1931) of the 1931-32 fiscal year fell to £8,276 from £11,952 in the corresponding period of 1930-31.

## New Chemical Trade Marks

Opposition to the Registration of the following Trade Marks can be lodged up to July 29.

**Disperso.** 528,421. Class 1. Carbon black for use as a reinforcing agent in the manufacture of india-rubber tyres. Wishnick-Tumpeier, Inc., 365 East Illinois Street, Chicago, Illinois, United States of America. January 7, 1932.

**Redline-Glico.** 530,929. Class 4. Petroleum and petroleum products, benzol, turpentine substitutes, naphtha and coal tar products, all being raw or partly prepared substances used in manufacturers, not included in other classes. Redline-Glico, Ltd., Waterloo House, 16 Charles Street, Haymarket, London, S.W.1. April 11, 1932. Registration of this Trade Mark shall give no right to the exclusive use of the word "Redline."

## New Companies Registered

**Arthur Berlandina, Ltd.** Registered July 4. Nominal capital £1,000 in £1 shares. General produce merchants, brokers and agents, dealers in seeds, nuts, oils, fats, resin, turpentine, pitch, tar, etc. A subscriber: A. Berlandina, Crofton House, Mayfield Road, Sutton, Surrey.

**Bremners' Chemical Compounds, Ltd.,** Orchard Street, Pendleton, Manchester. Registered July 1. Nominal capital £1,000 in £1 shares. Chemists, drysalts, oil and colour men and druggists, manufacturers of and dealers in chemical and other preparations and compounds, etc. Directors: E. B. Irwin, T. C. Moorhouse, E. J. Fielding, E. B. Irwin is permanent.

**London Carbonising Company, Ltd.,** Liverpool House, 15-17 Eldon Street, London, E.C. Registered June 29. Nominal capital, £100

in £1 shares. Manufacturers, distillers, refiners and producers of and dealers in smokeless fuels, coal, coke, coal tar, ammonium sulphate and other forms of ammonia, pitch, asphalt, briquettes and gas, manures, etc.

**"Red Band" Chemical Company, Ltd.,** Richmond Terrace, Dalry Road, Edinburgh. Registered in Edinburgh on June 25. Nominal capital £1,250 in £1 shares. Manufacturing chemists, etc. Directors: H. J. C. C. Smith, Mrs. A. L. M. Smith, Mary V. Lindsay, Mary M. Walker.

## A New Liquid Resin

### A Product of United States Origin

A NEW liquid resin to be known under the name of "Abalyn" has been developed by the Naval Stores Department of the Hercules Powder Co. in the United States. This new product is a resinous plasticiser for nitro-cellulose lacquers and other products. Its properties indicate that it will find a wide application in the manufacture of such products as clear interior lacquers for metal and wood, alkali-proof lacquers, leather lacquers, coatings for fabric and paper, non-drying inks, rubber cements, adhesives, waterproofing compositions, transparent paper and similar products.

"Abalyn" is a pale yellow viscous resin that has a solvent action on nitro-cellulose in the presence of alcohols. It is not appreciably affected by alkalis or weak acids and does not hydrolyse with boiling water. It has a faint, mild and ester-like odour; is insoluble in water and is an excellent water-proofing and impregnating agent. It is a substantially non-drying product although it oxidises very slowly to a pale yellow resin. It has a solvent action on practically all natural and synthetic resins, rubber and drying oils, is not corrosive and does not liver with basic pigments.

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